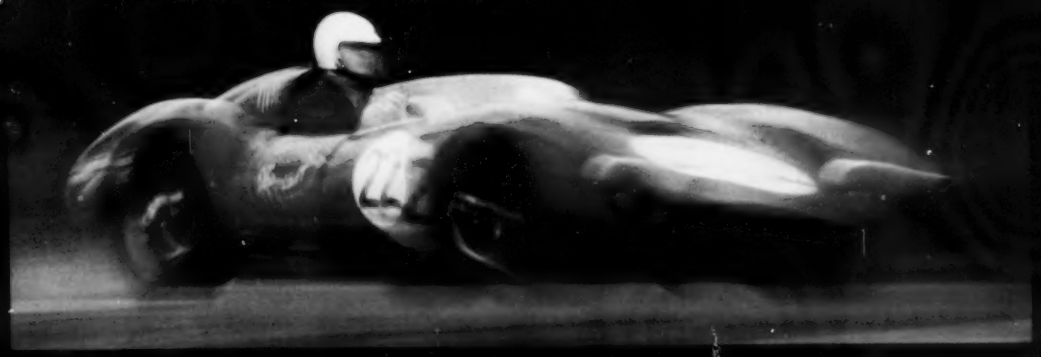
SPECIAL CHEVY ISSUE / 1960 PREVIEW

SPORTS CARS ILLUSTRATED

sports : economy : competition

50¢ march 1959



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by RACER BROWN

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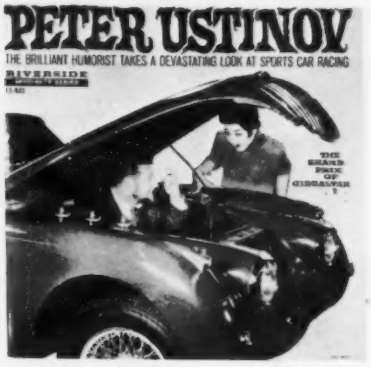

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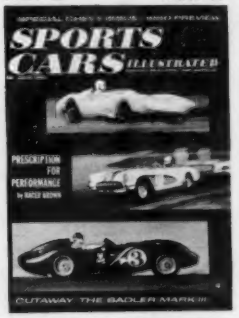

All three cars have something in common . . . they are powered by variations of Chevrolet's 283 cu. in. V8. Top to bottom are the Sadler Mk 2 and 1957 Corvette, photographed by Tom Burnside, and Lance Reventlow's Scarab, photo by Adler.

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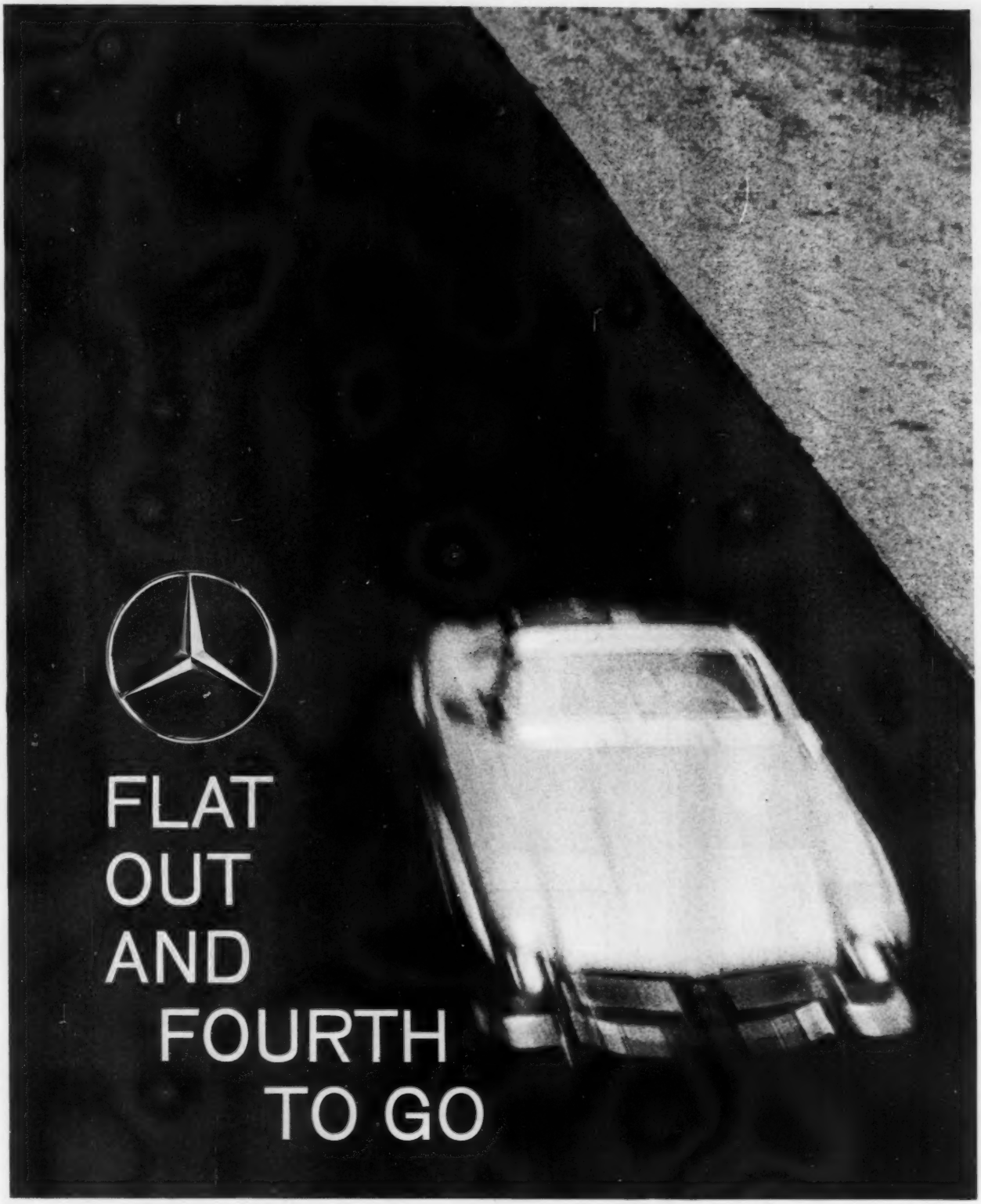

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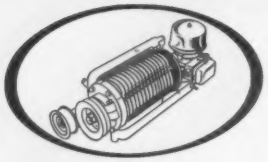

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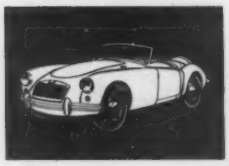

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very sincerely yours:

FROM TIME TO TIME in the past 50 years or so, engineers have come up with a product that is so outstanding for one reason or another that demand for the item has gone far beyond any reasonable expectation. Such an item was Old Henry's fabulous Model T. Another such was the MG Midget in virtually all of its many guises. In recent years the Volkswagen has become the phenomenon of the decade.

Not only has it been the entire car that has engendered such public acclaim; on occasion the item has been a basic or component part. One such was the fantastically reliable Ford flat-head V8 which from its inception was capable of being modified to such an extent that more than four times its original horsepower could be put through it without harm. In only slight variations it lasted for 22 years. Another such is England's Ford 10 which is still being used both as a production item and as the basis for more specials and prototypes than almost any other form of power. When Ford's venerable flat-top V8 was put out to pasture in '53 it seemed as if an old friend had passed away. Never again, it seemed, would there be such a versatile package of power for so little money. The hiatus lasted only a year.

And then from a source that was noted more for economy and transportation for Maiden Aunt Minnie came Chevrolet V8. From the minute it came out of the box it began showing muscles in totally unexpected amounts.

Today it is safe to say that there isn't a car of sufficient interior space in the world that hasn't had a Sheh-Vee stuffed into it by some dedicated soul. Chev-powered equipment has taken on the best in the world and decisively beaten it time and again. And it hasn't been through inches alone, either, in fact at times such equipment has given away inches and still come out on top.

"But it's *modified*," some dissenters will say. Sure it is but no more so than such fierce equipment as the 3.8 D-type Jaguar or the 5.8 Maserati V8 or the 4.9 Ferrari — and no more so than some of the Ford Flat-heads were.

As of this year it is safe to say that inches or no, Chevrolet's rocker-box has become the most versatile sports and racing power plant the motoring world has ever seen. There are larger engines and there are more powerful ones and there have been more glamorous ones but never has any engine been given the universal acceptance accorded the Chev. It has powered everything from International record breakers to dirt track machines and all points in between.

Gentlemen of Chevrolet, our compliments to you. Please don't change it.

—john christy

OH YEA!

"HAW . . . HAW . . . I'D SURE LIKE TO SEE THE EXPRESSION ON THE JOKER NEXT DOOR WHEN HE FINDS OUT I'VE TAKEN HIS PARKING PLACE . . ."

"ORAH MAE! . . . ARE YOU SURE ROBIE PICKED UP HER TOYS? . . . 'CAUSE I RAN OVER SOMETHING . . ."

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TEEN

I would like to form a club of New York City teen-agers with a common interest in sports cars. As far as I know there is no club in this area of this particular sort. A useful diversion for teen-agers is necessary; as a teener I think this would be ideal. Activities such as race films, navigating, helping at races, rallies and gymkhanas would be part of the program. Then too, the possibilities of a club project.

I would greatly appreciate any help that SCI could possibly provide in getting news of this venture into circulation. I hope that in this way I might be able to get together with others like me to plan the organization.

Thank you for any help that you can give.

Orrie Frutkin
1272 E. 36th Street
Brooklyn 34, N. Y.

UP WITH HEALEYS

Your road tests are very interesting. After having driven almost 60,000 miles in two Austin-Healeys I agree with all your comments on this fine car. There is one point however, an Achilles heel, so to speak, which mars to some extent the full enjoyment of the AH. I mean INSUFFICIENT GROUND CLEARANCE! I see no reason for the dangerously low and exposed position of the sump. On some roads in this country I find it impossible to shake off a well driven VW, just because I do no longer dare to unleash all those nice little horses under the bonnet after one split sump. Any suggestion?

Every good wish to SCI!

Felix Steinmann
Switzerland

Sixteen-inch wheels might help some and a steel gravel shield would protect the sump.—Ed.

PEERLESS

I thought your readers might be interested in the enclosed photograph of the Peerless Gran Tourismo.

The car in question is No. 3 and is a prototype, not a production model. Since I took delivery in mid-September I have put over 6,000 miles on the car, covering some of the remoter and more mountainous areas of Colorado, Wyoming, and Utah without any mechanical failure. The car's road-handling qualities are all that its manufacturers claim for it.

Joan H. Fish
Denver, Colorado

Peerless report coming up soon.—Ed.

OLD FLICKS

I have just finished the fine December issue of SCI, and you certainly deserve credit for a job well done, I look forward to more of these "bonus issues" in the future.

I was very glad to see (at long last) a story about the late, great Frank Lockhart. I have an uncle who was working in a hotel (as a matter of fact, the one in which Lockhart stayed) at Daytona Beach. To the best of his recollection, my uncle described Lockhart's fatal accident, and Griff Borgeson's article certainly filled in the open spaces. Thanks to my uncle's generosity, I am now the proud owner of five photos which he obtained at Daytona in 1928, they show: 1) Lockhart in the car, 2) Lockhart standing next to the car, 3) Lockhart's body lying on the sand after it had been thrown out of the Black Hawk, 4) Mrs. Lockhart reaches the body and 5) the wreckage. Photo #2 was autographed by Lockhart the day before the accident, it simply says: F. Lockhart (all spelled correctly). Again thanks for a terrific story.

Your series on the greats of racing are excellent. I am looking forward to a story on the inimitable Rudi Caracciola. I have read his autobiography (which was a gift from Mr. Caracciola) and it was terrific.

One of the photos in the Lockhart story was from a news film of the accident, could you give me the address of the source that supplied you with the film. I am always on the look-out for good racing film (8mm), and it may interest your readers to know that the Peerless Camera Stores, on Lexington Avenue, in New York City has a fine film called "Speedway", it has some excellent shots of the 1937 European Grand Prix season as well as the 1937 Indianapolis "500".

The film "Speedway" sells in its 8mm form for $4.27 and lasts approximately 13 minutes.

Peter Kilduff
New Britain, Conn.

TIRES

In regard to the statement credited to Firestone's McCrary, "There was talk later that we wouldn't sell them tires." (Monza, 1958).

On the contrary, English and Europeans were high in their praise of the helpful attitude of Firestone's crew. There were two reasons for their forced refusal of Firestone's aid. First, their drivers were almost without exception under contract with non-American tire manufacturers. That in itself would have been enough. Another strong reason was that their cars were not designed for the tire sizes available. It would have been possible to change wheels but this would result in other problems.

Mark Lintz
Big Springs, Neb.

Yes, indeed. A little-known fact about well-known races is that many manufacturers of automotive products, especially of oil, tires and spark plugs, contribute financially to those racers who compete using their products. In Europe, the driver's contracts with these companies may well bring in more loot than the race organizers' starting or prize money.—Ed.

(Continued on page 10)

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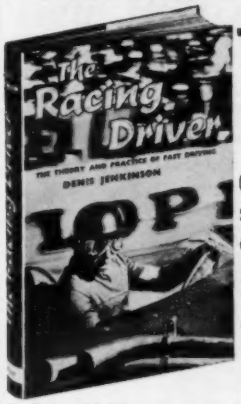

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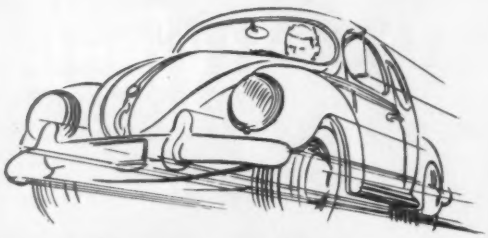

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letters

(Continued from page 9)

WINDY MORGAN

Regarding your September Road Test of the Morgan Plus Four Coupe, my thanks to you for exposing me to this fine "marque" as you put it. Since reading about the automobile I've succeeded in scuttling a tired TD in favor of a new Morgan Coupe identical to that of Mr. Spencer's.

One statement in your otherwise outstanding review of the car continues to puzzle me..."With the top down, windows and *windshield removed*"... Fortunately for Mr. Spencer—whose car would never have been the same—no attempt was made to "remove the windshield" which happens to be an integral part of the bodywork, justifying the British title of "coupe."

Bob Lackman
Seattle, Wash.

Maybe we could remove the glass?—Ed.

C.S.C.C.

In the interest of pair play and accuracy, I feel that I must point out a few errors in Leonard Pruyn's otherwise rather interesting article, "The Quick and the Dead," in your December issue.

Mr. Pruyn states that the California Sports Car Club, "a local area-wide racing fraternity..." (whatever a "local, area-wide racing fraternity" might be) "...have never released an adequate explanation for their reasons in not making roll bars mandatory." To put the facts straight, the California Sports Car Club made roll bars mandatory early this year and this regulation has been in effect throughout the 1958 racing season.

Such inaccuracies as this, plus Mr. Pruyn's statement that "CSCC is fairly new to the racing game" do not present either a fair picture of the California Sports Car Club or the sport of motor racing. For Mr. Pruyn's information, the California Sports Car Club sponsored its first road race in 1950, is the largest independent sports car club in this country, and in 1958 sponsored over twice as many miles of sports car racing as any other single club in the United States.

For the enlightenment of SCI and Mr. Pruyn, I enclose copies of the California Sports Car Club's magazine featuring a two-part article on road racing safety. This article, called "Facts of Life... and Death," is a good presentation with the Cal Club's attitude toward and concern with the subject of safety in sports car racing.

James T. Crow
Hollywood, Cal.

We apologize to the California Sports Car Club for the goof. Mr. Pruyn sent in a correction to his story, but unfortunately it did not reach us before press time. Deadlines can be deadly.—Ed.

REALLY RUSSIAN

In the December 1958 issue on page 23 you show a picture of a Russian racing car. Upon close study of this picture I notice that the fenders on this "Red racing machine" are suspiciously similar to the fenders on my 1934 Ford Coupe.

Could it be that the Russians really invented the Ford?

Skeptically yours,
Jim Gilligan
Los Gatos, Cal.

News is news only because it's new. The trouble is that some folks don't believe in things they haven't seen before. What can we do?—Ed.

F.I.A.

I read with considerable interest in your December 1958 issue the letter by Mr. Beck. I would think that, in the meantime, the FIA has fully taken care of the whole situation because, as you know, the last meeting of the International Sporting Commission in London approved the application of the roll bars for all international racing. I would think that maybe a note in the next issue of the magazine showing that FIA is on the ball, although it moves rather slowly, is rather appropriate.

I feel that the interest in FIA is so considerable that such matters should be corrected, don't you think?

Curtis J. Hoxter
New York, N. Y.

M-M

Your December issue is without a doubt, one of the finest ever published. Of particular interest was John Christy's "Return Of the Mighty M". Being a Detroit dishpan driver who has admired these great Mercedes cars from afar for quite some time, this article sent cold chills up my spine. By the way, is Alfed Neubauer, the old "Rennleiter" still associated with Daimler-Benz? Also, what are the present whereabouts of Carracciola, Lang and Von Brauchitch?

Herb Levinson
Indianapolis, Ind.

Neubauer is now retired, Carracciola is living in Switzerland, Herman Lang is still very much concerned with racing and Von Brauchitch is in retirement.—Ed.

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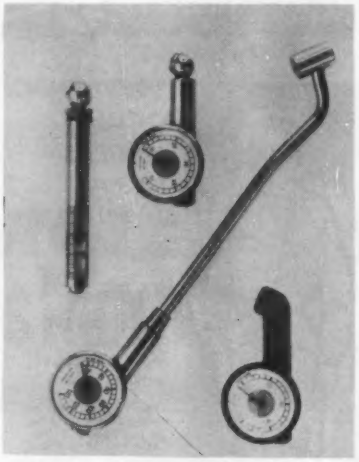

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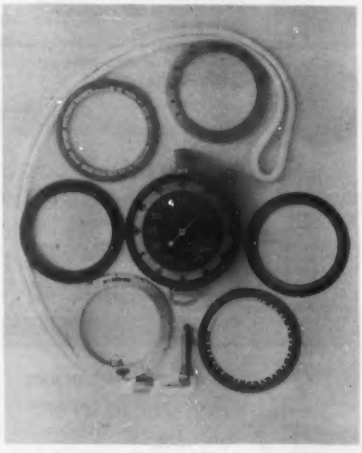

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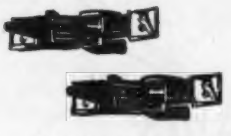

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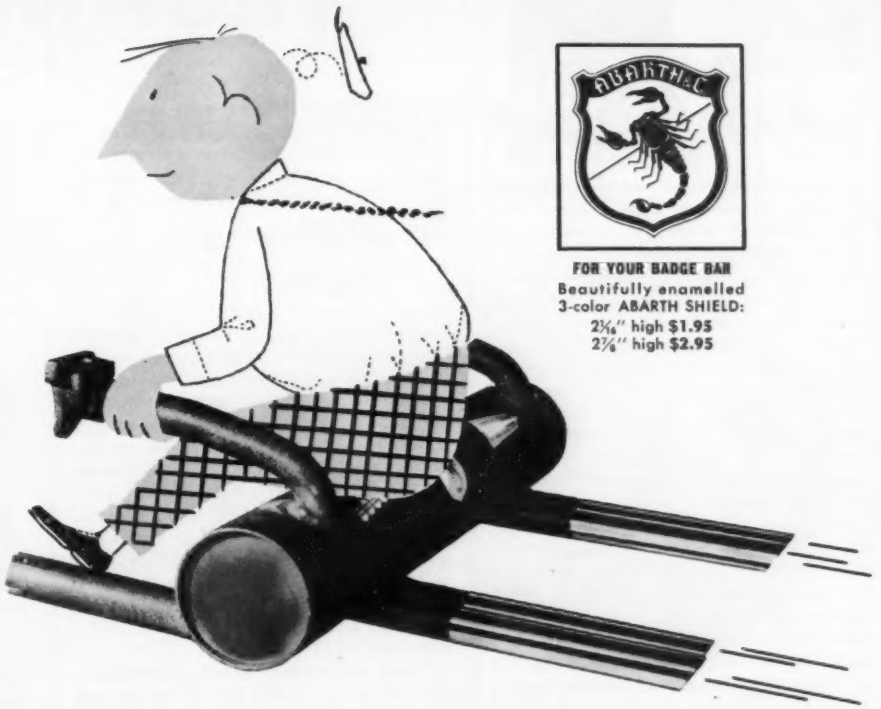

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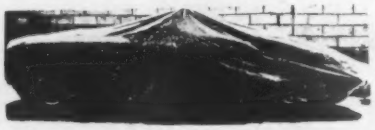
Marion's Meanderings

By
Marion Weber

Hi, there! Thanks to the faithful readers of this magazine we have done it again. We have pulled off another caper worthy of Charlie Brown. Our contest to "Name The New Mitten Material" drew so many entries we nearly had to have another contest to select a name from the batch submitted. Our judges, however, drunk with power (and reeking slightly of olives) emerged from their judging session with a unanimous choice and callously eliminated hundreds of worthy ideas. In fact so many good names were submitted that we are considering the thought of turning out some new products just to use them. For the non-alert reader, let us explain that we staged a contest via this publication to find an apropos tag for the new fabric from which we are tailoring our water-repellent Mitten car covers. This material is a light weight, fine quality poplin which has been treated with silicones to repel moisture yet remain porous so that it will "breathe" . . . permitting moisture laden air trapped under the cover to escape. Preventing fog, dew and mist from condensing on the wood, chrome, leather and fabric portions of your car is important to keeping it new-like. Equally important, of course, is the act of erecting a shield against fine, gritty sand and dust particles which cut and cause rot. The new Mitten fabric does just that and it is light, easy to put on and remove, folds into a small bundle and will last a long, long time. During that time it is steadily saving you money.

With all these thoughts bouncing around in their active little minds the readers sent in names like crazy. And, like we said, one has been selected. It is now being checked out with the copyright office and next month, if you can stand the suspense, that name, the name and address of the winner and nine runners-up will be featured in this space. Don't miss it. Meanwhile, order a Mitten for your car and cash in at trade-in time. If your car isn't listed below, write for free quote.



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TECHNOTES

CEYLONESE CHEVS

Although it may sound surprising to you, motor sport has taken a tremendous hold on us in Ceylon, and your excellent journal is immensely popular with the local enthusiasts.

I need your advice regarding a change of engines in my single-seater racing special (offset seating, as in sports cars). Although its sturdy MG XPAG 1250 cc engine has been tuned to its limit (Laystall hop-up, etc.), giving approximately 85 bhp on Aviation gas, I would now like to have more power in reserve and consequently am thinking of installing one of the smaller American V8s for participation in our Formula Libre events. I believe a number of MG TC and TD owners in the States have successfully managed to do likewise.

Of course I shall have to drastically modify the bodywork, etc., which is of aluminum and considerably smaller than a stock TD's The car weighs 11 cwts. *(1232 lbs.)* with a front track of 56 inches and a wheelbase of 137.

Please advise me as to two or three suitable V8 units. Accent should be on ease of maintenance, as spares are not easily obtainable in Ceylon. Light weight and squat shape would be helpful. Personally, I would prefer one of the following makes which are represented locally—say, 1954 onwards:

Ford, Chev, Dodge, Plymouth, DeSoto, Studebaker, Mercury, and Buick.

Spares are especially easy on Fords and Chevs. Incidentally, I would be more than satisfied with a minimum of 150 bhp in standard trim.

Furthermore, will the TC gearbox and rear axle stand up to the extra strain? If so, how should I mate the big V8 with the MG gearbox? I don't have to worry about brakes, suspension, steering, etc., as these are all competition tested non-MG components.

Incidentally, present tyre sizes are: front, 5.25 x 16 and rear, 6.00 x 16. However, I could easily fit larger tyres at the rear in view of the greater power available.

Thank you for some very entertaining hours of reading.

Kasi B. Rustomjee
Colombo, Ceylon

In view of the contents of this issue, your letter hardly needs an answer. But it gives me a chance to emphasize a couple of points.

For simplicity, the use of the four-speed Chevrolet gearbox is almost mandatory. It's rugged, too. The vastly increased torque will be better handled by also using a final drive (rear axle) unit from an equivalent size American car. 1948 and earlier Ford center sections are popular; one reason is that when you can afford it, the Halibrand quick-change center section uses all the same innards.

To start out with, you may indeed want only the stockest of stock engines. With a two barrel carb, the currently mildest Chev V8 puts out 185 bhp (advertised) and the four barrel Super Turbo-Fire *(!) claims 230 horses. However, the big, four barrel carbs seem to be very difficult to set up so they don't flood out in hard turns. So when you get tired of only 185 bhp, why not try an Edelbrock manifold which carries two or three Strombergs? Lots of breathing without the float chamber problems.*

Say, are you sure you measured the wheelbase from wheel center to wheel center? Eleven feet plus is sure long.

CHEVR-EALEY?

I would like very much to install a Chev V8 in my Austin-Healey. I understand that from the weight point of view it works out very well, simplifying suspension changes. Have you any data on this?

Tony Fair
Elliot Lake, Ontario

No doubt about it, Chevvies are being put in everything but go-Karts these days. Our favorite Healey-Chevy combination is the blue and white Dick Matthews conversion. In place of 519-pound Austin engine went a 546-pound Chev 265 cubic inch V8. Four of the 27 pounds gained were dieted off by fitting a Jaguar transmission (3.4 ratios are closest) which weighed 87 pounds. Happily, the Chev clutch fits the Jag shaft perfectly.

If the job were being done today, he'd probably use the Chev four-speeder. Closer ratios and eliminates the adaptor plate.

More dieting occurred when aluminum manifolds, special exhaust headers and lightened clutch-flywheel combination were installed.

He also used a Jaguar rear axle and drive-shaft to take the extra torque of the V8. After these basic steps, he got into many refinements which we haven't space to cover in detail such as stiffer front coils, additional frame bracing at the front, and a Corvette radiator.

An important point: a long notch is required in the frame to provide clearance for the starter motor.

SWAP OR RESTORE?

I am becoming a consistently firmer supporter of your increasingly fine and noticeably improving magazine. I am an enthusiast and a hopeful, whatever that means.

I have some questions. In digested form, since you probably know the questions as well as the answers, it's this way. I have a Mark V Jaguar which I am restoring. Should I put in a Chevy V8 or should I have the 14-quart *(oil capacity?)* push-rod six rebuilt? Can the six be pepped? If so, how so? Am I a creep?

That's really it in a nutshell. Everyone I talk with says something different. I would like the extra power of a Chevy but I fear the expense and the ability of the rest of the car to take the engine. I would like a rebuilt 3½ liter original engine but the parts for it are equally expensive; besides, it is not a very powerful engine and it is so poopy.

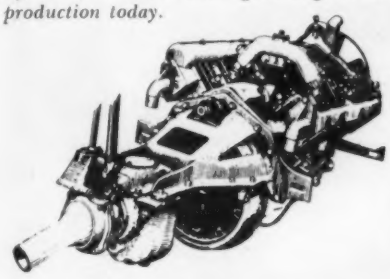
Maybe you know someone with a rebuilt 3½ liter engine for sale. Maybe a supercharger. I really need some sound advice.

Phillip Chronis
Los Angeles, Calif.

If your aim in restoring your Mark V is to take part in Concours d'Elegance events, then the engine swap would be strongly frowned upon. They probably wouldn't even let you buy a spectator's ticket. But for pleasant motoring in a car of distinctive styling, an engine swap has lots to recommend it, especialy if you can promise yourself to forswear drag-racing, formal or informal.

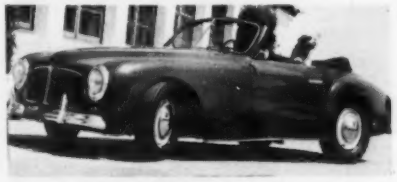
Why don't you install an ohv Ford 6. The rear end of this engine will mate quite simply Jag's transmission and you won't have the width troubles noted on pages 46-47. The Ford has lots of torque and economy, too, as well as fitting better.

Just because the Chev V8 has become extremely popular for engine swaps is no reason for it to be chosen automatically. After all, there are other good engines in production today.



CHEVROLETS IN ANCIENT HISTORY

It may come as a bit of a surprise to many readers to learn that the first Chevrolet V8 engine was introduced in 1917, the sixth year of the company's history. Points of similarity include the 90° vee, overhead valves. Note well-ventilated bell housing.



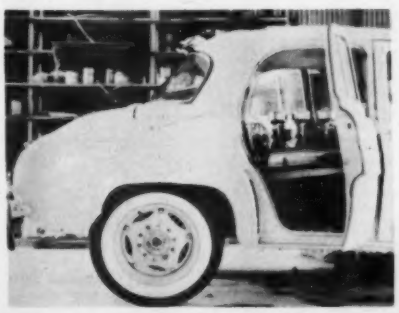
SIMCA-CHEVY

Other readers might like to hear of my 1951 Simca convertible, powered now by a Chevy Corvette engine. It does 0-60 in 5.5 seconds and top speed is over 130 miles per hour.

Jack Fink
Alameda, Calif.

HISPANO-ISETTA NEXT?

We wandered into a neighboring auto shop the other day to find this interesting project underway. More details in a future issue.



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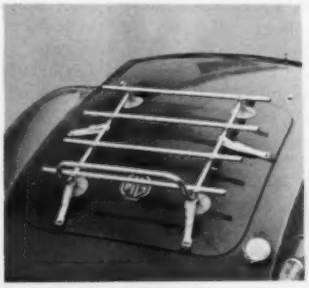

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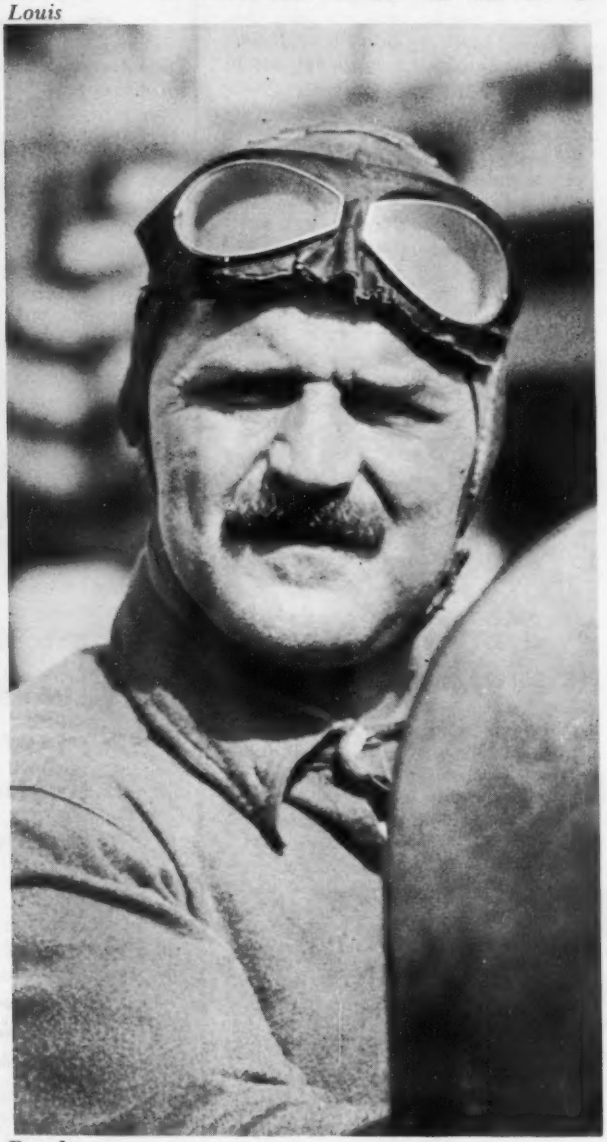
Gaston *Louis*



by Ken W. Purdy

LOUIS CHEVROLET is remembered as a man who designed a wine-pump and an automobile. The wine-pump didn't amount to much and he made little money from it. The automobile, the Chevrolet, became one of the legends of the century, a fountain from which billions of dollars flowed, but not much went Louis' way. He was a racing driver, too, Louis, and so were his brothers, Gaston and Arthur.

The Chevrolets were Swiss who moved to Burgundy in France from La Chaux de Fonds when Louis was an infant. As a young man he ran a bicycle shop, he invented his wine-pump and he came to America in 1900 to represent a French manufacturer. He lived in Brooklyn and he worked as a mechanic for a foreign car dealer, E. Rand Hollander. Gaston and Arthur had come across the Atlantic with him, hot with pride and energy, full of hope. France was the world capital of what was called automobilism in those days, and the three Chevrolets all wanted the same thing: a wheel, a ride in somebody's racing car. Hollander introduced Louis to Alfred Reeves, a race promoter who was looking for new boys to throw into the pit against the great Berner Eli Oldfield, a converted bicycle racer who'd been blowing off everybody with Henry Ford's "999", handle-bar steering and all. Louis was a hungry tiger and he went. He beat Barney Oldfield three times in 1905, once in a 10-mile race at Brunot's Island, Pittsburgh, once at Hartford, Connecticut, once at Morris Park, N.Y. Walter Christie, inventor of the front-wheel-drive Christie racing machine, was in the Morris Park field. Louis drove a 90 FIAT in those races.

He made the FIAT team for the Vanderbilt Cup race of 1905, and he wrote off the first car assigned to him, a 110 FIAT, laying it into a telephone pole. He took another car for the race itself, a 90, and was in 8th place at 150 miles when he hit a second phone pole. He was a heavy-footed driver, Louis, and so were his brothers. In the opinion of Peter Helck, whose view of the period is authoritative, all the Chevrolets were rough on the machinery.

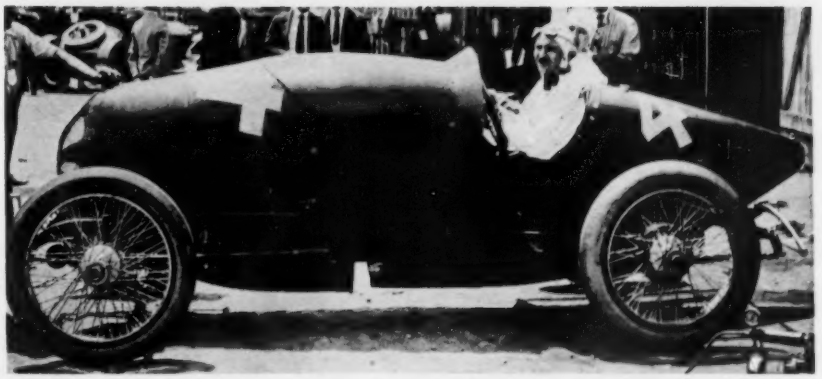
The Chevrolet driving style attracted a man who moved in much the same fashion in his own field: William Crapo Durant. Durant, a promoter who operated on the principle that $1000 was the smallest unit of U.S. currency, thought it would be nice to have a Chevrolet for a chauffeur. In 1908, when this notion occurred to him, Durant was head of General Motors, a company he had organized. He had been head of his own insurance agency when he was 21, and a millionaire carriage tycoon before he was out of his thirties. Promoters behind the Buick car being made in Flint, Michigan, asked Durant to come in and take over. He gladly did so. He raised Buick capital from $75,000 to $1,500,000. He sold $500,000 worth of stock himself—in one day. Price of the stock

quadrupled in four years, and the Buick plant couldn't keep up with orders. Everybody seemed in line for a killing except David Dunbar Buick himself, an inventor of fabulously diverse talent who was said, when he died a poor man, to have made at least 50 fortunes for others!

Durant decided to organize a really impressive holding company and call it International Motors, including Reo, Ford, Buick and Maxwell-Briscoe. Ford and Ransom Olds wanted too much money, so the deal collapsed, but Durant and Briscoe went ahead. They asked J. P. Morgan & Co. for $500,000. The Morgan lawyer didn't like Durant's attitude (almost *nobody* liked Durant's attitude) and besides he didn't see any future in the horseless carriage, so he recommended refusal. The decision cost the house of Morgan around $200,000,000. Durant went ahead anyway, and organized General Motors with a capital of $2,000. Twelve days later he made it $12,500,000. Sixty days later he bought Oldsmobile for $17,279 in cash and some GM stock and was on his way. He told the Oldsmobile engineers what kind of car to make. In fact, he showed them: he had the body taken off his Buick and sawed into four equal parts. Then he ordered the sections moved apart from each other. "Make a bigger Buick," he said, "with an Oldsmobile radiator and hood, and raise the price $250."

This, then, was the tycoon who in 1908 offered to audition Louis and Arthur Chevrolet for the post of chauffeur. He took them to the dirt track behind the Buick works and got into a car himself. Louis won and was somewhat surprised when Durant announced that the chauffeur's job was Arthur's. Louis had been faster, sure, but Arthur had taken fewer chances! However, there was a nice consolation prize: the Buick company raced its cars, as every contemporary manufacturer of any prominence did, and Louis found himself in the big leagues.

He began to run on the one-mile dirt tracks, and he won a fair share of the events he entered. Journalists of the time usually ranked him just after Oldfield, Earle Kiser and Jay Webb, the top drivers of the day. He ran a Cleveland in the 24-Hour race at Brighton Beach in 1908, and again in the same race in 1909 and 1910, placing fourth both times and sharing the wheel with Arthur in 1910. He ran in the 1908 Vanderbilt, and won the Cobe Trophy at Crown Point, Indiana in June, 1909 on a stock 30 HP Buick, 396 miles at 49.3. He led during 9 of the 17 laps. He won a 10-miler at Indianapolis in 1909, again for the Buick team. At Lowell, Mass., in September of 1909 he won the Yorick Trophy for 158 miles by a full 20 minutes. Trying for the Lowell Trophy on the same circuit he broke the Buick's frame after making the fastest lap of the day. In the same month he won his class at the Riverhead, L.I. Motor Derby, doing 113 miles at 70 MPH, which was really flying for the time. He led the 1909 Vanderbilt until a cylinder head cracked on the 4th lap, and in the 1910 running he lead for seven laps and then had total steering failure while in fourth place. He wasn't hurt, but his riding mechanic was instantly killed. Arthur was running in the Buck team that year, too. Louis was in a 2-mile event at the Atlanta, Georgia Motordrome in 1909, and a 200-miler as well, averaging 72 in a Buick.



Gaston and the Frontenac; to build it, the brothers missed founding a fortune.

Meanwhile, back at the foundry, Durant was making automobiles and big decisions. In 1909 he bought Cadillac. Henry M. Leland, who owned it, was a man who knew his mind. His first price was $3,500,000, take it or leave it in ten days. Durant didn't get around to it for some months, when he was told that the price was now $4,125,000, take it or leave it, ten days. Durant procrastinated again and when he went around with the $4,125,000 he was told that the market was up again: $4,500,000, take it or leave it, ten days. Durant scratched up the extra $375,000 in a hurry that time.

He tried to buy Ford for $8,000,000 (cash, Henry wouldn't touch anything else, and as a matter of fact, suggested *gold* cash) but couldn't raise it, the far-seeing New York bankers goofing again with the opinion that this represented a ridiculous over-evaluation of the Ford assets. He did acquire about two dozen automobile and accessory companies, though, grabbing them off like a mad squirrel harvesting nuts in a blizzard. Among them was something called the Heany Lamp Company, which had cost $7,000,000 in GM stock. Heany was one of Durant's mistakes. John Heany had a patent on tungsten incandescent lights which would have up-ended General Electric and everybody else in the business. But GE went to court and had the patent declared void. Durant's $7,000,000 had bought nothing. It was too much of a blow, and the board of directors began to bay. They thought Durant needed $7,000,000. Actually the company

(Continued on page 57)

Louis raced at Sheepshead Bay while company he helped build netted millions for others, not a dime for Louis.

Gaston would race anything for kicks. Here he races Aviatrix Ruth Law in Canada.

SCI ROAD TEST

'59 CORVETTE

Banked track hides considerable roll as Zora Arkus-Duntov places Corvette close in.

WITH EACH ANNUAL change, Zora Arkus-Duntov, the Corvette's godfather, has emphasized performance improvements. His theory is that to sell, the Corvette must first go. Styling has had its innings, too, but they have acted with more restraint than one expects from Detroit.

Perhaps in acknowledgement to the discriminatory taste of the sports car market, external changes for '59 were of a customizing nature only. The washboard-like, phony louvers on the hood and the Pontiac-like silver streaks on the trunk lid are now things of the past. Inside, there are recontoured seat cushions, a reverse lock on the four-speed's shift lever and an open-at-the-top catch-all which fills the opening in front of the "sissy-bar". Also the doorknob and arm-rest have been moved. Engineering changes at the rear include newly added longitudinal radius rods to prevent axle wind-up and re-arranged and recalibrated shock absorbers.

In discussing the new seats with Mr. Duntov, he pointed out that this is one of the most difficult compromises to make in a high-performance car. "In a racing car, the seat is 100% for working, just like a stool by a lathe. But in a passenger car, you're lucky if it's a 'work chair' more than 10% of the time. It must be easy to get in and out of, and comfortable for lounging in. The high sides of a real bucket seat are just right for holding you in place but they don't meet these other requirements."

Opening the trunk, later, we discovered an experimental seat cushion. We tried it and found it lets you sit a lot lower, accentuating the side support of the cushion edges and increasing headroom, too. The secret is foam rubber in place of the usual coil springs, the drawback is that it bottoms out too quickly on large bumps — sooner than the suspension. Oh, well, back to the drawing board.

Commenting on the door handles, Mr. Duntov pointed out that after driving Corvettes for thousands of miles on the Proving Grounds, he decided to move them forward during a visit to Riverside, California when he had to borrow a raincoat (?). The one he got had cinch-straps on the sleeves and he kept opening the door when turning left!

The sissy bar is unfairly named, it's really quite the thing for hanging on when the driver is trying to prove something or other. The trash tray appeals to us, too, though others have condemned it as unsafe. We suspect that someone must have been road testing with their knees tucked under their chin because it just isn't that low.

The world's largest producer of automobiles, Chevrolet offers not just a wide range of models, but a staggering array of optional equipment on each model. As on the sedans, so on the Corvettes. Five variations on the 283 V8 theme are offered, three transmissions (two, three, and four speeds), four final-drive ratios, three brake lining choices and two suspensions, just to name the mechanical ones.

There is some interlocking involved, for instance, you can't order the Positraction limited slip differential with Powerglide; the latter must have the 3.55/1 rear end and cannot have the 290 hp version of the Fuel Injection engine. On the other hand, the stiff suspension is available only in combination with the latter engine and Positraction.

For this test, the editors of SCI checked through the list of equipment options, nominating those we thought would add up to the most desirable all-around Corvette that you can buy. We had in mind, not the all-out racing version sampled in the December issue but a happy compromise that would be suited to both serious traffic and casual racing.

Having carefully selected our list, we were pleasantly surprised to find that the Chevrolet Division could put such a sample at our disposal immediately. Seems a fellow named Arkus-Duntov has a company car fitted out identically but for one exception. His car also has the quick-steering adaptor (3.25 instead of 3.7 turns lock to lock). Generally available only as part of the heavy-duty suspension kit, it's worthwhile on its own if you can stand the noticeably stiffer steering. And if you can get it.

Omitted from our list were the heavy-duty brake and suspension kits. For 1959, the heavy duty suspension features much stiffer springs than last year. In pounds-per-inch, the spring rate on the standard suspension, last year's HD kit and this year's are, respectively, 300, 340, and 550 at the front and 115, 125 and 145 at the rear. Though the kit's anti-roll bar diameter remains at 13/16-inches, the vast increase in spring stiffness contributes to both much flatter turns and much harsher bouncing. Nice for racing only, but not for the all-around usage we have in mind.

Corvette cornering has been the butt of many rude remarks by the anti-roll brigade. Duntov had interesting thoughts on this matter too. "For flat, smooth courses, such as Le Mans or Sebring," he said, "the heavy duty suspension option is very effective. But because it is so much stiffer, especially in roll, it would actually be a hindrance on a bumpy circuit such as the Nürburgring." An interesting thought, and interesting examples, too.

With so much power so freely available, rapid cornering necessarily becomes a maneuver requiring careful control of all the elements involved.

Though a stiffer anti-roll bar would reduce the independency of the front end, the reduction in roll would certainly promote more driver security. The experimental seats helped, so did the seat belts.

The steering, stiff for parking, was fine for controlling incipient slides, but as before, we found the throttle linkage much too sensitive. As a result, the car again appears to have two personalities. Either you motor sedately (though deceptively

Re-shaped seats increase lateral support.

Left, sintered linings; right, Cerametalix.

Axle wind-up prevented by radius rods.

quickly) through a corner, or pressing on somewhat, you're herding an untamed beast, one which responds more to the throttle than the wheel, and rather violently, at that.

In making up our list, the Cerametalix brake linings lost out as being entirely unsuited to highway use. When cold, they grab violently and erratically. Besides, they come only with the HD suspension.

Using regular drums, the sintered metallic brake linings at only $26.90 are so good and so cheap that they should be standard equipment. Though the 15° F. temperature during our test helped their heat dissipation, it gave us a chance to prove that they have no nasty habits when cold. Being inorganic, they don't soak up water either.

Flared drums, standard on all Chevies this year, have a bell rim-like flange which helps scoop air in from the inboard side. Between these and the linings, we repeatedly made stops from 90 and over without a trace of fade or increase in pedal travel. Pedal pressure, though, is higher than with organic (asbestos) linings. Running against a mild breeze, we managed zero to 100 mph and back to a standstill in 26.4 seconds, a figure that could be improved upon with experience.

Though it runs $484.20 more than the standard engine, we were anxious to see what the fuel-injected, hot cam V8's 290 horsepower felt like in a roadable Corvette. To its great credit, it must be mentioned that cornering antics have no effect whatsoever on throttle response. This is in great contrast to quad-equipped cars, whether single or dual. They will just plain quit in the middle of a hard corner.

Racer Brown's chart (see Part II of his article in next month's issue) indicates that the all-out dual-quad version boasts better output than FI-cars at the top end. However, the ability of the latter to mix correct quantities of fuel and air, no matter what the car's gyrations or speed, assures it of better lap times on any circuit.

That one Corvette is not the same as another is evident from the variety of options. What comes as a considerable surprise is the dualistic personality of the particular car tested. In the twinkling of a throttle linkage, it turns from a submissive, sidewalk stalker to a fierce, roaring eater-upper of metallic monsters. Just as quickly, it reverts to silent smoothness, its exhaust murmuring, barely audibly, "Who, me?"

This high output engine enjoys such tractability that it will pull smoothly from its 750 rpm warm idle in fourth gear. No flat spots, no hesitation, and no matter how fast you mash the throttle. Just to rub it in, you can start from rest in any gear whatsoever without stalling and with hardly a thought of the clutch lining. Strangely, starts in first gear seem equally touchy. Seems the "fast" clutch linkage (you have your choice of 4.5 or 6.4 inches of travel) has the unfortunate side characteristic that its mechanical advantage decreases quickly just as engagement occurs. For city traffic, we found that the combination of close ratios and the wide rev range made use of just first and fourth gears quite acceptable.

Despite this, the four speed gearbox ($188.30) was high on our list. For real get-up-and-go, it is well laid out. Shifting at 6500 rpm each time drops the revs only to 5000 or so, where the V8 is pulling strongly. To compare with the three speed box, all you do is skip second. Then coming out of first at 6500 drops revs to only 3900. Quite a difference when you're trying to make tracks.

Acceleration, while breaking no SCI records, is tops for pushrod equipment, and at the top end, quite similar to the 3.0 liter Ferrari 250 GT tested last year. Not so good off the line though, proving that smoothness at low revs is not synonymous with strength.

Duntov, in his kidding, quizzical way, said, "You know, the 3.70 axle gives better acceleration times than the 4.11." The operative word is "times", and specifically the times for zero to sixty, eighty and one hundred.

Assuming one is driving the car for best acceleration down a quarter-mile, (which is what we're after in our road test runs), this is quite true. With the 4:11 gears, shift points are 57, 75, and 95½. But with

Shapely body plays down large proportions of Corvette, derived from stock suspension.

the 3.70's, they change to 63, 83, and 106. The elimination of one shift and the necessary, though slight pause more than makes up for the lessened torque multiplication.

We thought our car went pretty good, even if it does cost twice as much as the Chev "315" tested in our January issue. But a recent letter from Don Gist of Lake Worth, Florida shows what can be done. Similar to this test car but without the weighty non-essentials and using the 4.56 Positraction rear end plus the following modifications, he has recently recorded a standing quarter in 12.57 seconds, completing it at over 109 mph! The changes he mentions are Traction Masters (his is a '58 model), open exhausts, an aluminum flywheel, Packard 440 wiring, 7.60 x 15 Bruce Slicks and the all-important flywheel shield. He adds, that the engine was "properly tuned." Uh-hunh.

If you want a particular kind of Corvette, pick out the options you want and GM'll make it. If they haven't the options you want, your local speed shop will.

If your interests lie in drag-racing, by all means pick the 4.56. If road-racing is more your style, then you'll probably want either the 3.70 or the 4.11, depending on which course you're running. Remember, 6500 in top corresponds to 139, 125, and 113 mph respectively with the 3.70, 4.11, 4.56 ratios.

For straight highway use, the 3.70, which we would now prefer, will provide the minimum of engine noise with plenty of acceleration. And if the chips are down, you can always use the gearbox. The 3.70 might improve gas mileage, but a lighter foot would help more.

On the luxury side, we chose the station seeking push-button radio ($149.80), the heater-defroster ($102.25), windshield washers ($16.15) and, sybarites to the end, both the folding canvas top and the removable hardtop ($236.75). Added to the $3875.00 base price, the total climbs to $5127.80; transportation and state and local tax are extra.

It's not a low price car, and it's none too cheap to operate, but it goes well, it stops well, and with reservations, it corners well, too. For all around performance per dollar, the Corvette is hard to beat.

—Stephen F. Wilder

'59 CHEVROLET CORVETTE

PERFORMANCE

TOP SPEED:

Estimated	125 mph

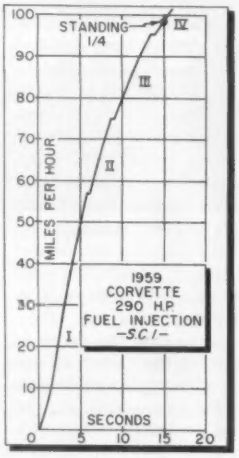
ACCELERATION:

From zero to	seconds
30 mph	3.2
40 mph	4.2
50 mph	5.2
60 mph	6.6
70 mph	7.9
80 mph	10.1
90 mph	12.3
100 mph	15.6
Standing ¼ mile	14.9
Speed at end of quarter	98 mph

SPEED RANGE IN GEARS:

(700-6500 rpm, 7000 permissible)

I	0-57 mph
II	8-75
III	11-96
IV	14-125



SPEEDOMETER CORRECTION:

Indicated Speed	Timed Speed	Indicated Speed	Timed Speed
30	29½	70	65
40	38	80	74
50	47	90	83
60	56	100	92

FUEL CONSUMPTION:

Hard driving	10 mpg

SPECIFICATIONS

POWER UNIT:

Chevrolet 283-FI	Water-cooled V-8
Valve Operation	Pushrods and stamped rockers
Bore & Stroke	3.875 x 3.00 in. (98.4 x 76.2 mm)
Stroke/Bore Ratio	0.774/1
Displacement	283 cu. in. (4640 cc)
Compression Ratio	10.5/1
Carburetion by	Rochester fuel injection
Max. Power	290 bhp @ 6200 rpm
Max. Torque	290 lbs.-ft. @ 4400 rpm
Idle Speed	750 rpm

DRIVE TRAIN:

Transmission ratios	test car	optional ratio
I	2.20	(2.21)
II	1.66	(1.32)
III	1.31	(1.00)
IV	1.00	
Final drive ratio	4.11	(3.70, 4.56)
Axle torque taken by	rear springs and radius rods	

CHASSIS:

Frame	Welded box section side members, I-beam X-member, box section front and rear cross members
Wheelbase	102 in.
Tread, front and rear	57, 59 in.
Front Suspension	Unitized, independent, coil springs and unequal wishbones, 13/16" dia. anti-roll bar.
Rear Suspension	Rigid rear axle housing, semi-elliptic leaf springs, upper radius rods
Shock absorbers	Delco telescopic, 1¾ in. piston diameter
Steering type	Saginaw worm and ball bearing sector, 16.3/1 ratio
Steering wheel turns L to L	3.25
Turning diameter, curb to curb	37 ft.
Brakes	Sintered metallic linings in composite drums with cast iron rim, pressed steel web
Brake lining area	108 sq. in.
Tire size	6.70 x 15
Rim size	5.0 x 15

GENERAL:

Length	177 in.
Width	73 in.
Height	51½ in.
Weight, as tested	3400 lbs.
curb (factory figure)	3092 lbs.
Weight distribution, F/R as tested	53/47
Fuel capacity	16.4 U.S. gallons

RATING FACTORS:

Specific Power Output	1.02 bhp/cu. in.
Power to Weight Ratio, laden	11.7 lbs./hp
Piston speed @ 60 mph	1560 ft./min.
Braking Area per ton, laden	63.6 sq. in./ton
Speed @ 1000 rpm in top gear	19.2 mph

IS THIS THE CORVETTE IN YOUR FUTURE?

by Dean Parker

GM's sports car has come a long way since the days of the Polo-white six-cylinder plastic bath tub, but look what the Company's planning for the future.

If Chevrolet is planning to use steel instead of fiberglass as the body material for the new Corvette, this would involve a redesign of all body dies. There is no reason to believe that the 1960 model will resemble to any great extent the models of the past years. Using as a basis the customized Corvette of Mr. Mitchell, and especially the rear deck and fender treatment, Don Typond has carried this through in the design shown on the following pages. The "wind-split" down the center and the knife edge line around the middle are continuations of the design of the rear end. The Corvette family resemblance is maintained by the use of cut-outs on the sides of the body, and by the familiar shape of the windshield which has been raked back at a greater angle. The flattened hood and front fender line has been suggested by this year's Chevrolet.

THAT CHEVROLET is going to bring out a new Corvette next winter is common knowledge. They've done it every year since the model was introduced. But this year the rumors have gotten wilder than a high-lift camshaft. Aluminum engines, five-speed transmissions, independent rear ends, space frames, aluminum bodies, 400 + cu. in. engines . . . if you believe everything you hear it looks like the sports car to end all sports cars is about to emerge from the Motor City.

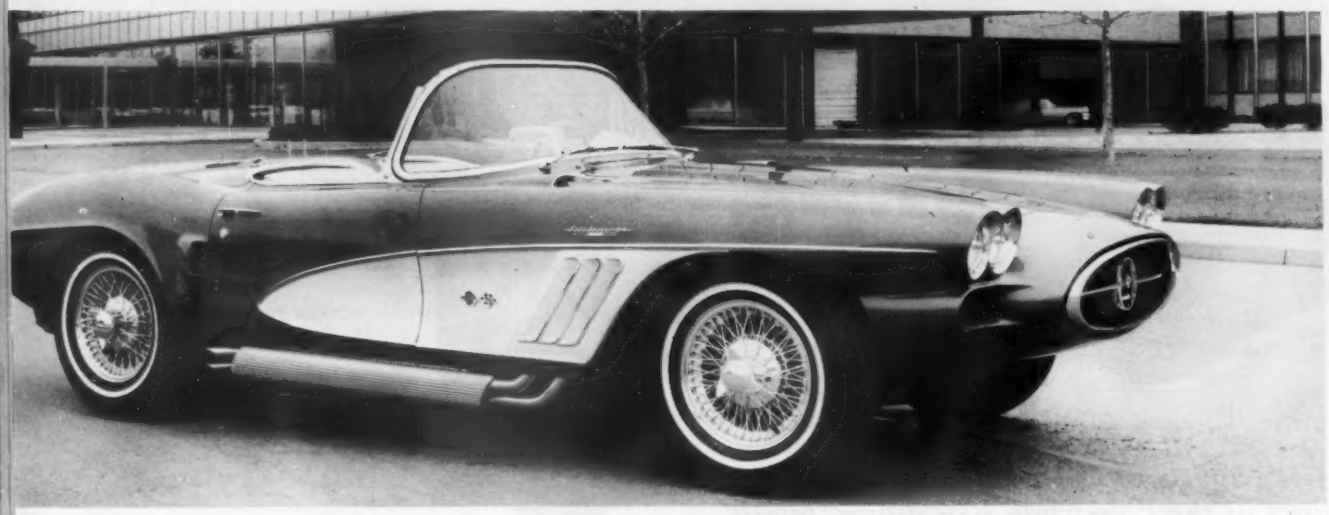
Actually the new 1960 Corvette won't be quite this radical. It will be a solid, evolutionary improvement on what is basically a five-year-old design. It will be one of the world's top sports cars, from standpoints of performance, handling and style.

Here is some "well-informed speculation" on what's coming up, gathered from many reasonably reliable sources.

Let's begin by establishing that Chevrolet has been thinking seriously about a new Corvette for three years. The current body and chassis has been basically unchanged since the car was introduced in early 1953. The bulk of the tooling investment was paid off long ago. Furthermore, this original Corvette never achieved its intended sales goal — the big market for a "personal" two-seat sports-type car. Ford came in with their better-styled and roomier Thunderbird and all but ran the Corvette right out of the market. Chevrolet had little choice but to concentrate on performance and push the Corvette as an out-and-out sports car. (This was no hardship to project head Zora Arkus-Duntov!) But this is the why behind options like fuel injection, 4-speed transmissions, metallic brake linings, etc.

Under other circumstances this failure to achieve a planned sales goal could've killed the Corvette before it ever got rolling. Fortunately Chevrolet general manager, Ed Cole, was patient. Today, even though the Corvette has never been a big seller, its value to G.M. in terms of free publicity and prestige has been great enough to warrant tooling for an entirely new version. And what's important to you, the performance theme has now become firm company policy. Chevrolet is not going to compete with Thunderbird with their new Corvette. Performance and handling will continue to be the design watchwords. The engineers will consider luxury and big-car roominess—but you can bet they won't sacrifice performance to get it. They'll be more apt to spend a few extra bucks to save weight, and include technical features that would be a waste of money on the mass market.

Two views of the special Corvette built for William L. Mitchell, GM vice president in charge of Styling Staff.



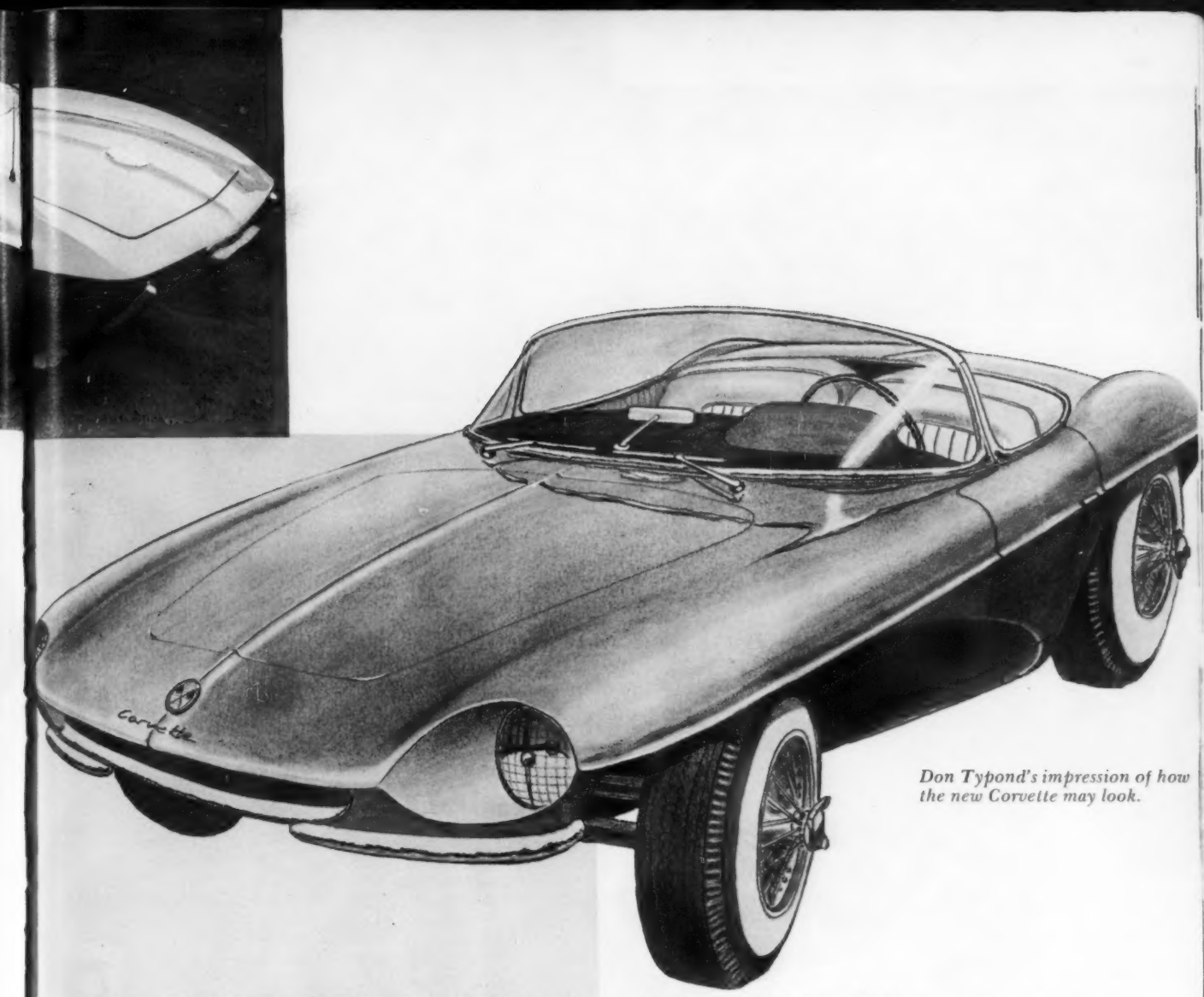
Duntov's crew are on a never ending five-year plan to build a suitable car for U. S. enthusiasts. But because it represents a small percentage of Chevrolet production the Corvette gets only a fragment of each year's re-tooling budget. Many changes will come, but not all at once.

It looks now like the new body will be steel, constructed with new low-cost plastic dies. (These dies are suitable for production rates up to about 25,000 a year, and are much less expensive than steel dies.) The fiberglass body has not proved to be as economical in limited production as originally hoped. The hand layup and vacuum molding process is a nuisance. The body weight of only 340 lbs. is attractive; but Chev engineers tell us the extra beef built into the frame to compensate for lack of strength in the fiberglass structure takes away all the weight advantage. They say they could build a short-wheelbase body for the Corvette out of steel that would carry some of the car structural loads; then a relatively light frame could be used—and the whole car would weigh less than the current fiberglass job, maybe by as much as 150 lbs. if they designed carefully! The bug earlier was the die problem. New plastic dies now make it practical to tool for steel bodies in production rates less than 10,000 a year. This looks like the pattern now.

Stylewise the new Corvette will bear little resemblance to the current model. Wheelbase and overall dimensions will be comparable, but the car will be given a longer, sleeker look by extending the hood forward and down into a Ferrari-like "snorkel" grille opening. Then the front and sides of the body will be shaped to act as huge air ducts for front brake cooling. The fender sections will be cut away at the front to expose the brakes, and the body sides will be swept inward behind the wheels to provide an exit vent for the air flow. The whole deal will be a lot like some late Testa Rossa Ferraris. Actually, some of these rumored styling features coincide suspiciously with a "customized" Corvette that was built last summer by G.M. Styling for their new chief, Bill Mitchell. The car has been on display in the lobby of the Styling building at the Tech Center in Detroit. This is the car, photos of which appear on these pages. It hasn't yet been run on the streets. Draw your own conclusions.

Chassis plans are far from finalized. We know that Duntov was well pleased with the handling of the experimental SS chassis at Sebring in '57, and the word is that he would like to incorporate as many of these engineering features as possible on the new Corvette, within the required cost framework. You can discount space frames, unit or monocoque body construction right off . . . much too expensive. The frame will likely be a channel X, but much lighter than the current design. Front suspension is said to be of the conventional coil spring-wishbone layout, with tubular shock inside the coil, and incorporating ball joints. Some regular Chevrolet passenger car parts could be used here.

The big story would appear to be in the rear end. Persistent rumors mention a DeDion setup on coil springs, with the transmission mounted in unit with the differental. You'll recall the SS used a DeDion rear end, but with the gearbox on the engine. No details have leaked on the wheel control linkage; but the SS setup, with two sets of trailing



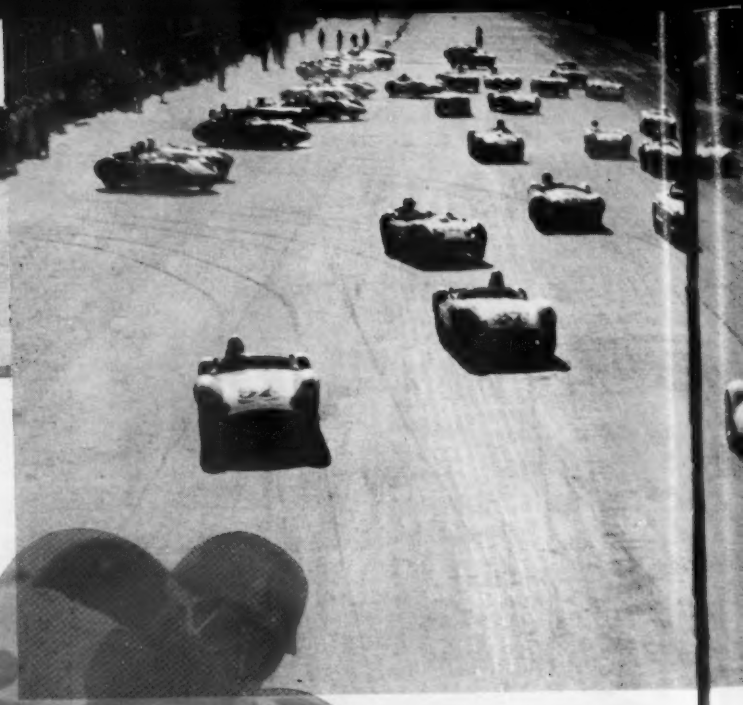
Don Typond's impression of how the new Corvette may look.

links for both fore-and-aft and lateral control, looks economical and practical on paper. We hear the rear brakes will probably not be mounted inboard. This would cost some unsprung weight, but might be considerably cheaper to produce. The idea of mounting the transmission at the rear, of course, is to get a more even front-rear weight distribution for traction . . . and, don't forget, the "polar moment" of the car is increased by putting this mass farther from the center of gravity. By thus increasing the "flywheel effect" when turning about the CG, we get somewhat more directional stability at speed and when cornering hard (up to a point). The rear-mounted transmission is the coming thing on all types of cars. Incidentally, we hear no rumor of any new transmission for the Corvette; the current 4-speeder will likely be standard.

Brakes? — no need for improvement here.

And, last but not least, the engine. The next Corvette will not have an all-new engine, as rumored—nor will it use the big 348-cu.in. V8 that's doing such a good job in the passenger cars (see Borgeson's road test in the January '59 SCI). The current 283-cu.in. engine weighs 90 lbs. less than the 348—and that's more than enough reason for the Chev engineers to stick with it for the Corvette. They're serious about this weight problem. In fact, they're doing a lot of experimenting with aluminum to trim the already-low weight of the 283. Remember the experimental aluminum heads for the SS? These were not used at Sebring; but they say the bugs are out of this design now, and there's a good chance they'll be standard on the '60 Corvette. (Remember that, with minor modifications, aluminum can be cast in conventional iron sand-casting equipment.) The water pump casting is also aluminum. The intake manifold will likely be aluminum. They're experimenting with all-aluminum blocks —using an aluminum-silicon alloy that needs no bore liners or plating—but this is not likely for '60. Anyway, with just aluminum heads, manifold and water pump we'd save about 75 lbs.—so the whole engine shouldn't run too much over 450 lbs. Is that worth thinking about??

The other big news item on the '60 Corvette engine is that it's going to be bigger. Chevrolet engineers have cherished their three-inch stroke with a passion—figured it was one big reason why the little 265 and 283 would turn such ungodly engine speeds and get so much horsepower per cubic inch. Could be. But certainly they've pushed the power development of this basic engine so far now (with the special cam, light valves, f.i., etc.) that piston displacement is about the only well left to tap. It is known that Chev engineers are experimenting with bores up to 4 inches and strokes up to 4 inches on the 283 block—which would give 402 cu.in. if combined! (The lower cylinder walls are relieved in the casting stage for rod clearance.) The standard '60 displacement won't be anywhere near this big, but we hear a figure of 332 cu.in frequently mentioned. Of course we can expect the usable rpm to come down when we lengthen the stroke—and this, in turn, will tend to bring down the hp per cu.in. But certainly a rating of, say, 325 hp at 5600 rpm wouldn't be too much to expect from a 332-cu.in. '60 Corvette engine with special cam and f.i. We'll see.

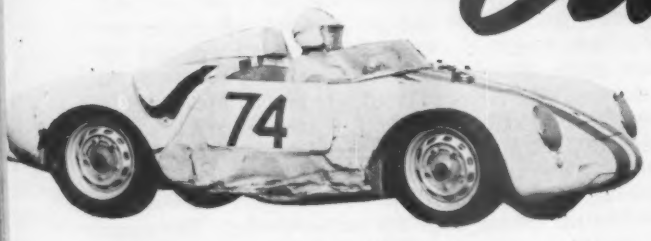


Reventlow makes up time in the early laps of the Nassau Trophy race. He ran 26 laps out of the 52 and then handed over to Chuck Daigh who won by a lap. During the entire week the Scarabs were unbeatable.

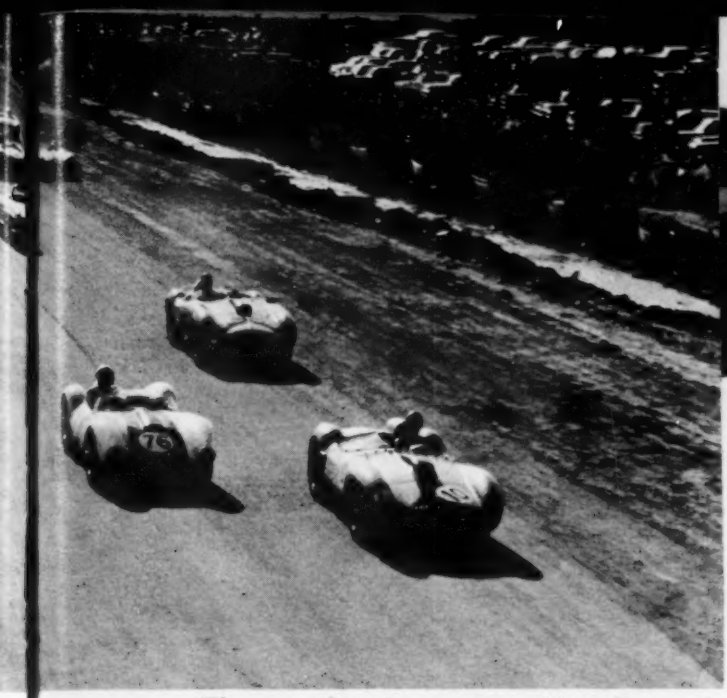
Mechanical gremlins and plain bad luck dogged Nassau Speed Week but it was still June in December and people had fun which is the reason for . . .

Crisco's Dices

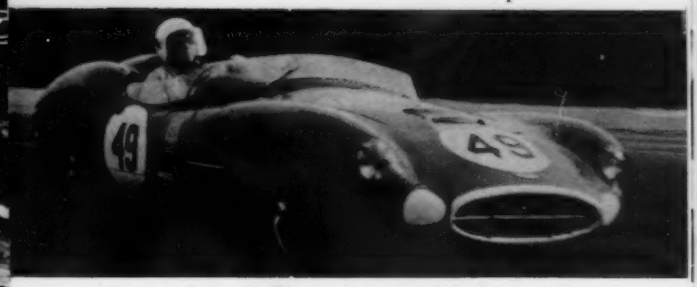
by John Christy



ABOVE—Don Sesslar's 1600 RS shows signs of collision with a row of little pine trees that marked some parts of course. RIGHT—Pedro Rodriguez was the dark horse of meet, taking second in his 3 litre LeMans-winning Ferrari Testa Rossa 250.



The start of the main event. Even with a balky start the Sadler #76 has boomed out even with Daigh's Scarab.



Always a threat, George Constantine in the 3.8 litre Aston turned in consistently rapid laps and was given an outside chance of winning until deDion tube failed.

THE STACCATO THUMP of big American V8 horsepower beat a victorious counterpoint to the cello-like howl of European machinery time after time during the 1958 Bahamas Speed Week in Nassau. In the modified classes the Scarabs, Chev powered and bolted together by Lance Reventlow's crew headed by Warren Olson and driver-engineer Chuck Daigh, had everything to themselves. In the production events on an overall basis, Jim Jeffords had it all his own way in a bright orchid '59 Corvette. In short, throughout the entire meet the big thumpers were unbeatable, bringing on a wistful wish that the FIA had not clamped down the three-litre lid on sports car championship events a little over a year ago.

To be perfectly honest about it however, the V8's had to work for their silver in both cases. The man who made them push was George Constantine who divided his time between an Aston Martin DBR-2 and an A-M DB 2-4 Mk III in the modified and production classes respectively, making the Sturbridge, Massachusetts driver about the busiest handler on the island. Throughout the entire meet George was the bridesmaid who almost wound up married to the groom. In every race for cars over two litres in each category the big green Astons were threats every inch of the way until the final main event, the 252-mile Nassau Trophy race when the pounding the Aston had taken made itself evident in a broken DeDion tube two thirds of the way through the race.

Another threat to the Scarabs was shown by the Sadler Specials (see center spread). Both the new and the old *(SCI Feb. 1958)* versions were brought to the island but this was not to be Bill Sadler's week. In the first place time was short and the new car had not time to be shaken down. The next thing was snow. A howling snowstorm marooned Bill, his wife and the two cars in upstate New York for 26 hours. The result was that the Sadlers arrived in Nassau in mid-week with no time for more than a check-up before drivers Bob Said and Allen Markelson in the new and old cars respectively had to run for practice.

The Sadler gremlin continued to operate full-bore. Within minutes of entering the course Markelson in the old car was headed for the beanfields at turn one. No harm came to Allen but the front suspension on the car was badly bunged. The new car developed injector troubles and had to go back to the shop. About this point the Sadler crew should have elected skin-diving as a hobby and headed for the beach. As it was Bill and another mechanic worked 36 hours straight through to get the little blue and white boomers going. On Sunday morning, December 7, they were as ready as they were ever going to be for that particular race meeting—they had to be; it was the last day and time for the main show.

The curtain raiser, the Nassau Memorial Cup race, was started with a paced lap and as the pack came by the stands Bob Said took the new machine into the lead as though the rest were standing still. In fact he took off so fast he lost his face shield. Pulling in for goggles he lost only seven positions. Again charging off Said picked off two of those positions even though the leader was touring the course at an 88.5 mph average. Then it happened. Fighting through toward the lead the car went into a long slide. Normally such a slide is merely time consuming but the Sadler gremlin was working overtime. In a wide field of gravelly tarmac with acres of space around it was a lone marker light, a memento of the time when the Oakes Field course had been the main airport for the island. Out of all that real estate to slide through, the car picked the same piece of ground as that occupied by the marker. The light was only a couple of inches high but it was enough to slash the rear tire and bend the left rear half-shaft. The new car was scratched for the main event.

Came the start of the main event and the older car was rolled to position for the LeMans start even though both Markelson and Paul O'Shea had complained of strange handling characteristics following the earlier trip into the brush. Even though the front end had been straightened, the alignment was apparently off.

"This was an old friend," said Bill later. "I thought I'd be able to haul it around okay so I said to put it on the line and I'd start it."

He did. The flag fell. First off was Carroll Shelby in John Edgar's monster 5.8 litre V-8 Maserati. The "Old Friend" balked at the start—unusually—and then caught, making Bill about the fifth or sixth to get under way. He came out onto the course in a long slide and shot away, the Chev screaming through its eight individually tuned exhaust pipes. By the time Shelby was braking for the first turn the Sadler machine was practically climbing on his deck lid. They went into the turn nose to tail. The rest is Bill's story:

"I went into the turn and suddenly I was all over the road and all crossed up for the second turn into the straight. I slowed down enough to make that one and got through but barely, holding up everybody else in the process. This just wasn't the same old friend."

By pussyfooting the other turns and booming on the straights, Bill stayed up for the rest of the lap but the going was too tricky. He pulled into the pits and scratched the entry. The gremlins had won. In their brief appearances the two cars from Canada showed that with the right preparation and piloting they could hold their own with the fastest sports-racing cars in the world but the jinx and lack of time was more than dedicated men could cope with.

Sadler wasn't alone, either. Another new machine, John Edgar's potent Pontiac-powered Maserati was going through a series of troubles, too. Piloting this one was Jim Rathmann but the car wouldn't stay together under him. Every time out the engine developed an appetite for head gaskets. A lap or two during which the big boomer would stay with the best—and then blooie. Once it was, according to report, a small rock that found its way into one of the four dual-choke Weber carbs and thence to the combustion chamber through the fist-sized ports but the rest of the time it was head gaskets pure and simple and for no discernible reason either. Every time Jim put his boot in it, a gasket let go and that, for the duration, was apparently that.

ABOVE—Coral surface of Oakes course is a tire killer. Firestone crew worked overtime mounting rubber at track. BELOW—Final blow; Said and Sadler inspect damage inflicted by marker light.

BELOW—Charlie Daigh gives the usual winner's finish-line interview in the gathering dusk. Lance, right, then announced car was for sale at $17,000!

Crise's Dices

Even the superbly prepared Scarab team had their problems. Though as a team they won everything in sight, they weren't without casualties. During practice they had clocked a shade better than 91 miles an hour average for the 4.5 mile course which is *moving*. Although the track is peppered with long fast straights it's also salted with some fourteen turns most of which are tighter than a treasurer's fist and therefor slow and a 91 mph average means speeds of upwards of 170 on the longer straights always. As a clincher, at one point during the race Chuck Daigh turned in a lap at better than 92 mph. But, as was pointed out, they had their troubles.

In Friday's 25 lap Governor's Cup race, the first for the modified machinery, the Scarabs with Reventlow and Daigh up slammed into the lead with Daigh out front. In minutes the flying pair had opened a lead of a full minute over George Constantine in the 3.9 Aston who in turn was hauling away from the others. Then Daigh coasted into the pits. The ailment was not an unusual one for Scarabs. The big Chevs put out an immense amount of torque and this twisting had wrung out a universal joint. This left Lance to carry the mail alone. As the race wore on Lance kept his lead and the crew began to sweat out the tire factor. Finally, in view of the long lead, they started hanging out the "Easy" signals. Still Lance circulated at three minutes, one second. Then "E Z Please" went up. The time fell to 3':02". And that was all. Lance finished the race still way ahead of the persistent Constantine and only then did it become known that he had lost third gear and had finished without shifting for the final five laps.

In the main event on Sunday the Scarabs were ready again. This was the big 252 mile grind and was set up for a LeMans start as mentioned earlier. Daigh and Reventlow got under way fifth and seventh respectively, laying great gouts of rubber in a scrambling effort to get up with Sadler, Shelby and Rathmann who had his boot deep in the engine room of the Maser-Pontiac, churning into second spot as Sadler dropped out. By the end of round one Reventlow's own gremlin struck but it was only a love tap as it turned out. Lance pulled into the pits frantically pointing at the hood. It wasn't a blow-up, though—just a loose hood which was made fast and Lance was on his way in seconds though dropped to tenth position by the stop. Daigh, meanwhile was working his way through fast traffic and finally caught up with Shelby in the huge Maserati who had been clocking a steady 89 and 90 mph average. Lance, too, was making up time. Then it happened again. Chuck's car wrung off another rear axle shaft just as Lance caught up with the parade of front runners. This left one Scarab in business. On the 28th lap, and in first place, Lance pulled in for fuel and tires and then turned the car over to Chuck Daigh. The rest is history. A jinxless 28 laps later Chuck rolled across the finish line winner by several minutes, having completed the 252 miles in two hours and 52 minutes, 48.18 seconds—an overall average including pit stops of 87.5 miles an hour.

The appalling lack of luck was not borne by the cars and crews alone either. The entire meet suffered. Speed Week was preceded by wonderful weather and then came Sunday, November 30 and the first scheduled race, the Nassau Tourist Trophy for production cars. Came also rain, buckets of it. The race was put off until Tuesday which was originally scheduled for a practice day. Monday was an unofficial practice day and a day for tuning cars and recuperating from some of the strenuous partying that is a major part of Nassau's Speed Week. Recuperating takes precedence over racing so Tuesday it was to be.

Came Tuesday. Came rain. No racing and no practice. To some the cancellation due to rain may seem strange but there's a good reason. The Oake's course is rough; a long life of pounding by aircraft and the elements has put pockets and ripples throughout the course. When it rains the water collects in puddles from an inch deep in some spots to over six inches in others. Slamming a fast car into a six-inch deep puddle can have the same effect as sudden application of unevenly adjusted brakes. On a course with straights long enough to build up velocity to 170 mph and better this can be unnerving.

The next day dawned bright and clear and stayed that way but this was also a "free" day with two parties scheduled. But the jinx held. The second party was rained out that evening. The weather and Promoter Sherman F. "Red" Crise just couldn't seem to get their schedules straight. Finally Red gave in and announced that there would by all that was holy be a race the next day, rain or no.

It rained. Hard. It started in a series of small showers that peppered the curtain raising Berkeley race which was won at the hair raising speed of 48.85 mph by Islander Dave Albury who took a mere 16 minutes to make three laps.

Then, as the production cars of under 2 litres lined up for a prelim five-lapper came the deluge. As Crise said, racing rain or not, so after a good soaking on the line away they went. This one was taken by Duncan Furlong of Miami, who charged out with his blistering Ace Bristol to win half a lap ahead of Jim Hunt of Ft. Lauderdale, Fla., in another Ace. Furlong took 19':14" to go the 22.5 miles for an average of 70.19 mph.

It was still raining when the big bore production equipment (over 2 litres) charged off led throughout by Jim Jeffords in the '59 Corvette, otherwise known as variously the Purple People Eater and, in some circles, as the Purple Petrol Eater. At

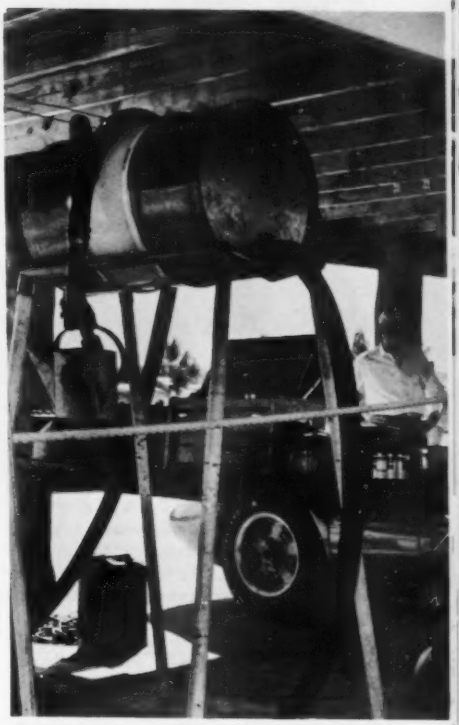
(Continued on page 54)

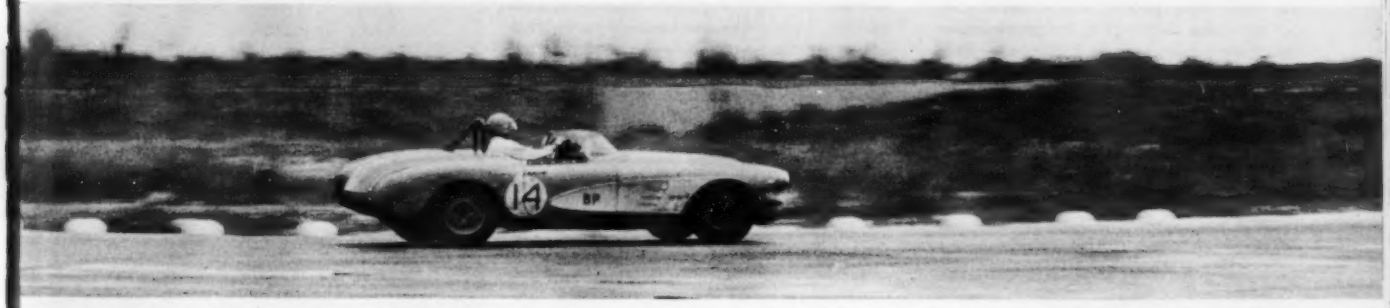
ABOVE—Peter Bethell had things all his own way, mopping up all three Islander heats and the two Austin-Healey heats in his Warwick-prepared 100-6 MM two-seater.

For four days rain halted both practice and racing, finally they could wait no longer and the Nassau Tourist Trophy event was started in the worst wet of the week.

BELOW—In the production class events it was Jim Jeffords and the '59 Corvette all the way. The purple bomb is the full competition prepared version (see P. 18).

Typical organization of the Scarab pit is seen in neat tool layout and gravity tank for rapid refueling.





RIGHT—Scarab pit crew wait during final laps for Daigh to come through. Signal board is a sardonic reminder that this one was for kicks and cups. BELOW—Barely visible in cockpit of his 1600 RS is Ricardo Rodriguez, cleaned up in under 2 litre but broke gearbox in main event.

EDITOR'S NOTE: When we planned this special issue one of the first questions to crop up was the one that asks why, in a race for big-bore production equipment carrying a field of maybe six to eight Corvettes will one or two of these run off and positively hide from all the other opposition including the other Corvettes and on inspection prove stock. It happens at almost every race and while it's easy to say "It's the driver" that is by no means the whole story. The major portion of the answer is that in store-bought equipment production tolerances are such that the run-of-mine product is just plain not up to the criteria planned by its designers. The other question that came up was how in the world could a production-run engine be made into what amounts to the best large capacity sports-racing engine in the world today bar none including even such formidable equipment as the Maserati V8.

To find the answers we went to W. G. "Racer" Brown, technical writer and now one of the foremost cam engineers in the country. It is his cams that have tickled the valves so neatly in all of the Scarabs' recent wins and few if any other men in the country have put as much time into Chevrolet's fantastic V8s.

What follows here in extreme detail is Racer's answer to the first question. It is in no sense presented as a do-it-yourself or back yard project. It is as complete a blueprint for performance preparation of an engine as it is possible to present. It is also a blueprint for making the Corvette engine last and last under any sort of pounding short of destruction-testing. Finally it is intended for anyone who wants a perfect Corvette set up as the designer planned it or who wants consistent race winning performance. The specifics apply to the Corvette but the general method and procedure applies to all sports car engines large or small. As we said, this is not a back yard operation; it is a set of directions one can take to a good mechanic with a car and tell the man "do it thus." The first portions, begun herein, detail the preparation of a production car. Racer's answer to the second question – that of preparing the Chev for insertion in an all-out car such as a Lister, Sadler, Devin or one's own special will follow in ensuing installaments.—jpc

Winning ways, even for stock machinery, do not come over the counter. To go and to stay together, even the Corvette must be carefully prepared. Here is an expert's..

Prescription for Performance

By W. G. "Racer" Brown

PART I

THE CHEVROLET V8 is a remarkable engine. The reference is to the smaller 1955 through '59 265 and 283 cubic inch engines. The larger '58-'59 Chev 348 cubic inch engines are something less than remarkable—much less, but the topic here is the smaller versions.

The term "remarkable" is a good one-word description of the virtues of this particular series of engines, produced en masse in Detroit and by the broadest interpretation of Detroit production methods. No one, not even the engine designers themselves, are quite sure whether the final production type was destined to be an outstanding powerplant from the start or whether all the pieces just fell together into a very rare but happy mechanical blending. Regardless, there hasn't been an engine like it before or since.

By 1957, actually the latter part of 1956, or two short production years after its introduction, the Chev V8 became the most popular engine in the country for all types of racing purposes. And for very good reasons. The engine is light in weight, the '55-'56 editions weighing in at 545 pounds for a complete engine, including all the cast iron accessories except the clutch assembly. Later units weigh about 565 pounds due to some structural stiffening dictated by heavy-duty experience with the '55-'56 types. The engine possesses an almost uncanny ability to produce very high power readings at near-astronomical revolutions per minute. Any intelligent modification is rewarded with a gratifying bulge of the power curve. Indeed, this device is surely the most wonderfully responsive engine available today at any price. And, speaking of price, the over-the-counter cost of a new and complete engine assembly makes scouring the junkyards almost a waste of time, and sometimes money.

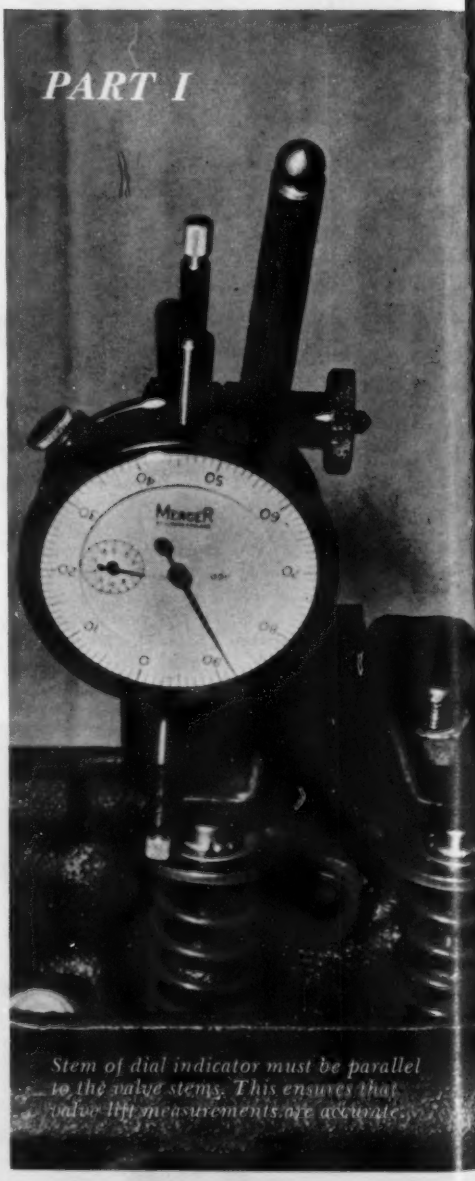
When one considers the potentialities per dollar invested, the Chev V8 is one of the biggest bargains in powerplants of all time. Yet, regardless of the praise we heap on it, the engine is not without faults, even though they may not become immediately obvious. For example, in its most frequently-found racing trim, that of powering Corvettes and passenger cars alike, it is a torque-less wonder; the "wonder" being how so much power can be developed with so few pounds-feet of torque. The answer, of course, is the number of revolutions it turns and the willingness the engine displays to turn more revolutions. But the usual run-of-the-mill production Corvette has a hard time getting off the dime at the fall of the flag, meaning too much weight for the torque available at low engine speeds. Another fault, this one a bit more serious, is the lack of structural rigidity in the block assembly. In a passenger car this is no particular problem. However, in racing engines, even in stock Corvettes, this lack of block rigidity shows up as premature main bearing wear. Examination of the bearings discloses that the block, and consequently the crankshaft, are moving about at places where things should be as solid as possible.

There are other faults that will be touched upon as we progress. But one thing is certain: the virtues outweigh the faults and most of the faults can be corrected, or at least contained, before serious troubles develop.

In out-of-the-crate form, a Chev engine will run quite well indeed. But it, like other products of Detroit, is somewhat overrated in terms of power. A fuel injection engine rated at 290 brake horsepower at 6200 rpm actually develops 245 at 5750 rpm or some 16 percent less than the advertised value.

However, a stock out-of-the-crate engine that proceeds to set the competition on its collective ear is a very rare occurence. In this respect this engine is no different from any other; it has to be made to perform its best.

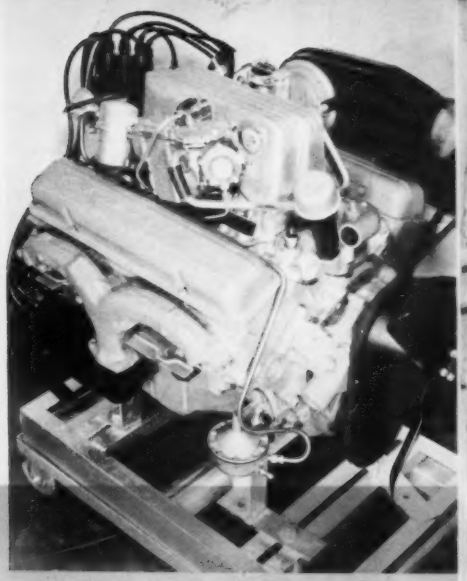
Our first consideration here is to improve the breed as applied to Corvettes, staying within the framework of existing production car class rules. Later we will dabble in bolt-on and bolt-in equipment. Still later we will learn how to modify and maintain the Chev unit into a Grade A competition engine of championship caliber.



Stem of dial indicator must be parallel to the valve stems. This ensures that valve lift measurements are accurate.

Dots on two timing chain sprockets must line up exactly with camshaft and crankshaft centers. Easy place to goof.

Dial indicator, degree wheel are essential for rechecking valve timing which often varies. Text explains how to correct it.



Before and after treatment, Chev 283 V8 should look like this. Small differences within make big difference at flywheel.

CYLINDER BLOCK ASSEMBLY

Whenever possible, the latest production engines and components should be used, unless there is good reason for doing otherwise. This confines our efforts to the 3⅞-inch bore, 3-inch stroke 283 cubic inch engines of 1957 and later. The '57 and later cylinder blocks contain stiffer main bearing webs and 1/16 inch longer main bearings than earlier ones. The cylinder bores are also noticeably more concentric with the surrounding water jackets. Although pre-'57 crankshafts will interchange with later cranks, the additional counterweighting and detail changes in the crank cheeks make the later cranks more desirable.

Connecting rods should also be of the post-'57 variety, preferably new and definitely magnafluxed or X-rayed whether old or new. Connecting rod bolts are critical. Throw away the old ones and magnaflux the new ones, paying particular attention to the radii beneath the heads and the juncture of threads and shanks. Use new stock self-locking connecting rod nuts.

1958-'59 fuel injection pistons are the logical choice because of increased stiffness in critical areas and because the shallow inverted V crown increases the compression ratio. These also contain generous notches to prevent piston-to-valve interference. Piston pins are supplied when Chev pistons are purchased new and these will be sufficiently stiff for our present purpose. Piston rings should be of the passenger car type, not those specified for heavy-duty applications. The passenger car rings are identical with the Perfect Circle "98" ring set, which contains chrome plated compression rings and their excellent chrome plated, double-rail oil control ring. These rings are not severe but properly applied and installed they can cope with the widely varying conditions of compression and oil control demanded by road racing.

In the matter of main and connecting rod bearing inserts, use Morraine "400" aluminum bearings, period. These are standard equipment in Corvette 270 and 290 engines and may be purchased from Chevrolet dealers. The aluminum is considerably more helpful in transferring heat to the lubricating oil than conventional steel-backed inserts and the bearing material is completely compatible with the induction hardened crankpins and main bearing journals of the forged steel crankshafts. If the crankshaft requires grinding, undersized bearings of the correct diameter must be used but standard sizes are preferable, if possible. Camshaft bearings should be stock Chev steel-backed babbitt of standard diameter.

If an engine is purchased as an assembly, it must be dissassembled right down to, and including, the last nut, bolt and washer. The same applies to an engine already in service. The work ahead cannot be done to an assembled engine. Following disassembly, every piece must be thoroughly cleaned and scrubbed with clean solvent, hot soapy water and a scrub brush and a hot water rinse, in that order. Welch plugs and threaded plugs in the block must be removed and the inner surfaces of the block must be scrubbed and examined for defects as closely as possible. Following this, new Welch plugs should be installed and arc welded in place to prevent any future difficulties from this source. Great pains must be exercised in cleaning and flushing the drilled oil passages in the crankshaft. At this point a magnaflux or X-ray inspection of some critical pieces is definitely in order. These pieces include the crankshaft, main bearing caps and bolts, connecting rods, rod caps and bolts and piston pins. Not even the most minor cracks or flaws are acceptable.

Now, all the pieces are present, accounted for and in good shape for building up the block assembly, but we aren't even close to the assembly stage yet. Not by a long shot. To be assured of a first-class reliable powerplant, a considerable amount of machine work is not only desirable but downright mandatory.

Starting with the block, corrections must be made to faults that appear all too frequently, particularly in Chevs. The first problem is finding a machine shop with a surface grinder large enough to hold the block. The dowel pins to locate the cylinder heads on the block faces must be removed. Then a fixture must be improvised consisting of a large, straight and preferably ground steel arbor to be inserted in the main bearing saddles and clamped down by the main caps to 75 pounds-feet of torque. One end of the arbor is clamped in a chuck attached to an indexing head with the other end positioned by a dead center. The height of the arbor from the grinder table must be the same at each end, assuring fore-and-aft parallelism. The indexing head is rotated until one cylinder head surface is as parallel as possible with the grinder table then locked in place. A light cut is made with the grinder across the cylinder head surface, the depth of which must be sufficient to clean up the entire surface. The height of the freshly-ground surface must be very carefully measured from the grinder table with a vernier height gauge. The indexing head is then unlocked and rotated exactly 90 degrees to bring the opposite cylinder head surface into position. The height of this surface must be carefully measured, which will determine the amount to be removed by the second grinding operation. The finish-ground surfaces must be smooth and free from grinding wheel chatter marks. Also, burrs and sharp edges must be removed.

This procedure is calculated to do two things: First to make sure that the height from the center of the arbor, which represents the crankshaft, is the same to each cylinder head surface from one cylinder bank to the other and from front to back. Second, it corrects any angular discrepancy from one cylinder head surface to the other. If Chev production tolerances weren't so loose this wouldn't be entirely necessary. This operation sounds complicated but it's duck soup to an experienced machinist. In fact, there are two shops in the Los Angeles area that do the job for $20 per block.

The ground surfaces give us a good perch from which to launch our next attack; that of boring the cylinders for the largest acceptable (or available) pistons. Maximum oversize factory Chev pistons

are .040 in. over the standard 3⅞ bore size. Pre-'57 blocks should only be bored to 3⅞ inches to '57 and later specs. Before running amok with the boring bar, the pistons must be carefully measured at the bottom of the skirt at right angles to the piston pin bore. The block must be bored for a skirt-to-wall clearance of .004 to .005 in. The factory recommended clearance at this point is .0005 to .0015 in. but this has got to go in favor of a sloppier fit in the interests of less friction and consequently a slight improvement in mechanical efficiency and net power.

Each piston should be checked for clearance in its respective bore with a feeler gauge and numbered to prevent future cross-ups. A small drill point hole in each piston denotes "forward", meaning that the drill mark must point to the front of the engine. Also, the deeper ends of the notches for valve clearance must be closer to the inside of the block, otherwise mechanical chaos will result. When these two points are correct, the offset piston pin bore will automatically be right.

The pistons must also be checked for sufficient clearance between the ring lands and the bore. This must be from .020 to .025 in. This is important because when the pistons are in operation and have attained maximum temperature, the additional skirt clearance will cause the pistons to rock in their bores, bringing the ring lands at the top in closer proximity to the bore. If the ring lands are left alone, they will actually make contact with the bore, which will eventually cause the rings to become siezed in their grooves, hence their effectiveness as seals is lost. This correction is best applied to the ring land only in a small engine lathe.

Now back to the crankshaft. This item should be farmed out to a good crank grinding shop for a size and alignment check and, if necessary, for grinding. In grinding the crank, the inside diameters of the rod and main bearings must be considered because the crank must be ground to allow .002 in. clearance on rod bearings and from .002 to .003 in. clearance on main bearings. This means a very close measurement of the color-coded bearings in order to determine the finished diameters of crankpins and main bearing journals. Grinding the crankpins will automatically equalize the stroke on all four pins and will establish them at the proper 90 degree intervals, two points often overlooked in quantity production.

If a crank doesn't require grinding, it should be checked for straightness, correct stroke length and proper indexing of the crankpins. Variations are just cause for rejection or regrinding. It should also be "super-finished" on the crankpins and journals to bring the diameters to the low side of the tolerance.

Next come the connecting rods, which are also victims of production tolerances. The two critical rod dimensions are center-to-center length between the large and small ends and the diameter of the bearing bore. Chevs use piston pins that are pressed into the rods so that needn't concern us now. To correct for length and bore variations, the mating surfaces of rod and cap must be ground, removing from .005 to .010 inch on each surface. The rod cap is then secured with the rod bolts and some old rod nuts and torqued to 40 pounds-feet. The rod is then clamped in a lathe or internal grinder fixture that locates the small end on an expanding mandrel with the large end accurately located at the axis of rotation. The fixture is then rotated on the lathe or grinder spindle and, using an internal grinder, the out-of-round large end of the rod is ground to the correct diameter which, at the same time, restores the proper center-to-center length.

Following this, the rods, pistons and pins must be assembled and checked for alignment. At this time, the small ends of the rods should be honed to permit a light push fit of the pins through the bores. This requires the pin bores in the pistons to be machined for snap rings for retaining the pins. Or aluminum plugs may be made for a light push fit in the pins. This operation doesn't make the engine run any better but it certainly makes for much easier assembly and disassembly.

This brings us to the point of balance. All rotating and reciprocating parts must be statically and dynamically balanced by a specialist balance shop. This means crank, flywheel, pressure plate, vibration damper, connecting rods, caps, bolts, nuts and bearings, pistons, pins and rings.

Finally the block assembly is ready to put together. Well, almost. There is first the matter of measuring the main bearing clearances. This is done by installing the main bearing in the block and main caps. The tabs on the bearings must be gently tapped back fully into the recesses provided for them both in the block and in the caps. The crank should be placed in the block, first wiping the bearings and journals clean of all dirt, dust and oil. Place a strip of Perfect Circle Pastigage on each journal, then install the main caps and bolts but without the rear main seal, making sure the caps fit snugly into the steps machined in the block. Tighten the main bearing hold-down bolts in increments of 25 pounds-feet of torque until the maximum of 75 pounds-feet is reached. Do not turn the crankshaft! Remove the bolts, caps and strips of Plastigage and measure the strips with the scale provided in the Plastigage package. The bearing clearance must fall between .002 and .003 in. Remove the crankshaft, thoroughly oil the bearings, journals and crankpins and reinstall as above, omitting the Plastigage but including the rear main bearing seal. Now check the fore-and-aft clearance of the crank between the thrust surfaces of the crank and the thrust surfaces of the rear main bearing. This may be done with a dial indicator or a feeler gauge. The clearance should be from .002 to .006 in., preferably between .004 and .006 in.

The rod bearing clearance must be checked in the same manner, again using Plastigage. The clearance must be .002 in. The combined end clearance with two rod assemblies bolted on one crankpin must be between .008 and .014 in., preferably toward the latter figure. Torque on rod bolts should be 40 pounds-feet. As with the main bearings, the tabs on the rod bearings must be tapped into their respective recesses. Also, it should take a slight push to seat the bearing fully into the rod and cap. The latter two points are extremely important. Entirely too many Chev engines have been lost due to sloppy workmanship on main and rod bearings. The small tab on each bearing shell is all that keeps the bearing from rotating within the main and rod bores. These being locked-in bearings, they are not meant to rotate. So if the tab is not properly positioned in the recess and if the bearing shell is a loose fit in its bore, then rotation of the bearing within the bore is encouraged. When this occurs, the tab slips out of its recess and acts as a wedge between the crank and bearing cap. If one is lucky, the result is immediate siezure. If one is unlucky — well, better have a broom and dustpan handy. The word has apparently gotten around that Chevs and other engines using the same type of bearing are in dire need of full-floating bearings similar to those used in 1932 — '48 Ford and Merc V8's. While it is true that some engines do require this kind of treatment, the Chev does not, provided that the bearings are properly fitted and installed.

At this stage of the game, there are three items that are indispensible to the final bolting together of the block assembly. The first requires that $1.50 be spent for a Chevrolet shop manual, available from most well-stocked dealers or from Chevrolet Division in Detroit. This book is very thorough in spelling out all the details of engine assembly. Of course, some of the dimensions and tolerances will be at variance with ours but we are interested in maximum performance and, after spending almost five years in close company with this engine, we know ours are right for this particular application. The second and third items cost not a penny in terms of money. They are laboratory cleanliness during and after all phases of assembly and gobs of patience to make sure that each detail is just so.

Before we let the shop manual take over the chore of directing final assembly, there are some points worthy of emphasis. All the nuts, bolts, studs and miscellaneous pieces contained in the bottom end of the block assembly must be positively secured. The one exception is the self-locking rod nuts if they are new and properly installed. Main bearing bolts must be drilled and each pair safety-wired together in the best aircraft fashion. The same applies to the bolt holding the oil pump in place on the rear main bearing cap. Ditto for the flywheel bolts and the three bolts holding the camshaft sprocket in place. In places where safety-wire isn't convenient, new split spring type lockwashers must be used. Chev screened oil pump pickups have been known to fall off causing the ruination of all bearings. The pickup pipe should be brazed to the oil pump body casting, eliminating such nonsense before it starts.

The oil pan is next to receive its share of attention. Two sheet steel baffles, each an inch or more in width, must be welded to the inside of the pan. Each baffle runs fore-and-aft for the length of the deeper sump section of the pan and each is welded on a horizontal plane. The vertical location of the baffles must be well above the normal oil level but low enough to avoid interference with the crankshaft. This simple expedient will keep the oil from climbing up the inside of the pan and block during long, fast turns and the more disastrous consequence of having the oil pump pickup run dry. It's also a wise plan to install a couple of accessory type breathers to the pan, preferably on the left side and again well above the oil level.

Now that the lower end is properly put together and secured so that it won't fall apart from its own vibrations, we can plunge into some of the more romantic aspects.

CAMSHAFTS & VALVE GEAR

This is an area where even the most thoroughly initiated mechanic can easily become ridiculously loused up. At the risk of being exiled to Detroit by my associates in this phase of the business, I will climb out on a long limb, with saw, and make a bold and brash statement. To wit: There are two acceptable camshafts available from your friendly, smiling Chevrolet dealer. "Acceptable" means that they will do a job, within their limitations, for the engine we have thus far constructed. These camshafts are the '57 and later Duntov, Chevrolet part number 3736077, list price $29.15 and, rather surprisingly, the '56 standard Corvette mechanical lifter cam, Chevrolet part number 3711354, list price $21.65.

However, some racing clubs and associations openly permit camshaft changes to be made while other associations merely tolerate them. Still other groups are quite stuffy about it all, insisting on factory available equipment. The point here is to really know the rules of your own group and to take adavntage of said rules. This does not imply that one should knowingly cheat. But if the opportunity exists to use a special camshaft, grab it. If the racing group isn't concerned with special cams, then the sky's the limit. Well, almost. Such groups have usually and wisely specified that *all* valve train components be of factory origin. This automatically eliminates steel billet cams of both flat lifter and roller varieties, all special pushrods, double valve springs, spring retainers, etc. But this is no tragedy if one knows where to look for a special camshaft that will do the job with the above stock pieces.

In order to be classified as better than the two stock cams above, a special cam must be blessed with several seemingly-conflicting attributes for the Chev engine to respond at its best. And this engine, above all others, will respond like gangbusters to the right cam. First, the cam should be of the short effective valve timing type. This will insure a reasonable idle and good torque characteristics. Second, the torque should be right strong in the mid-range, say between 2500 and 5000 rpm. Third, maximum power should be reached in the 6000 rpm range. Fourth, the engine should rev freely to at least 6500 and preferably to 7000 rpm before being effected by valve spring harmonics or actual valve float or both. Too much effective valve timing will not only torpedo the engine's torque potential, which at best isn't too strong, but it will actually lop off the top end power as well and, in general, will make engine performance quite miserable. Not enough effective valve timing will intensify the torque in the low and mid-ranges but the engine will be gasping for breath at the top end. Thus our special camshaft is pretty well defined.

But, at the $29.15 price, the late Duntov cam seems quite difficult to pass up. However, it wouldn't be any sensational bargain even if it were free. It is nice and easy on the valve train, the engine can be twisted a blue zillion, the price is right and it's available, period. The low and mid-range performance of this cam is quite poor, the idle is worse and even with properly adjusted valve clearances, it's entirely too noisy. So we're building a race car. So who cares if it's noisy and evil-tempered at low speeds? You, friend, *should* care even if you don't. Torque output in any race car is of paramount importance and, in dealing with Chevs in particular, we simply cannot afford to ditch the torque potential merely for sound effects. This point deserves considerable emphasis. The torque characteristics of any racing engine is certainly more worthy of development in the right direction than trying to obtain absolute maximum power. The range of maximum or near-maximum torque should be as broad as possible and as high as possible insuring good flexibility and acceleration, even if this means a horse or two less at the very top end. With the camshafts available today, there is no reason to accept less. However, to satisfy rules in some racing groups, the Duntov cam or some stock substitute must be used. It should be realized that the Duntov is a compromise cam and because of the shortage of mid-range torque, it is actually somewhat obsolete as compared to those offered today. Actually, top end power of the late Duntov isn't too bad; nothing outstanding but just not too bad. If we're restricted to using stock pieces, this is the cam to use for the faster courses. The cam works at its best in the 4500 to 6500 rpm range. Below about 4000 rpm, performance is definitely dull. The power is over the hill at about 5800 rpm but engine speed can be increased to 6800 rpm safely and perhaps to 7000 rpm with a set of selected valve springs properly set up. With these points in mind, the car should be geared for the particular course so the engine speed can be kept within the above range whenever practicable. On the straights, the engine can be turned up to 6500 or roughly 10 percent past the maximum power peaking speed. On some courses it would be advisable to gear the car for the turns and to lift the throttle foot a bit down the straights. A glance at the power curves shows that the power literally drops off a cliff after 6500 rpm. At 7000 rpm, the beginnings of valve float are evident because the engine will not hold a load on the dyno even though the float is not yet audible. The point here is that the Duntov cam is quite limited in range and the decision to use it should be determined by course conditions.

As an incidental, it is quite difficult to find two Duntov cams that will check out exactly the same regarding valve timing. They will, however, come reasonably close to these figures measured at the valve and with the correct operating clearances: Intake opens 34 deg. BTC, closes 79 deg. ABC, duration 284 degrees, net valve lift .393 in. Exhaust opens 75 deg. BBC, closes 29 deg. ATC, duration 284 deg., net valve lift .388 in. From this it can be seen that the cam is advanced 2½ crankshaft degrees from what is referred to as "split timing"; that is if the same cam were timed 31½ - 72½ on the intake and 72½ - 31½ on the exhaust. This is desirable because the advanced condition will

(Continued on page 50)

Connecting rod bearings are not intended to be full-floating. To prevent mishaps, it is essential to tap the locating tab well into recess provided.

Left, fuel injection's 10.5/1 pistons are specially machined to provide dome and valve reliefs. Below, early stock Corvette cam used with solid lifters has flat on rear journal. '57 and later Duntov cam has wider lobes and no flat.

SCI **TECHNICAL REPORT**

Built to order as the Nisonger KLG Special,

the Sadler mk 3

will out-dig, out-stop and out-corner anything from Hollywood to Modena. Soon we'll know if it can out-race them, too.

by Stephen F. Wilder

MANY A special builder dreams of someday becoming a bona-fide producer of sports cars for sale, but precious few ever get close. A brilliant exception, Bill Sadler of St. Catherines, Ontario bids fair to become Canada's answer to England's Colin Chapman.

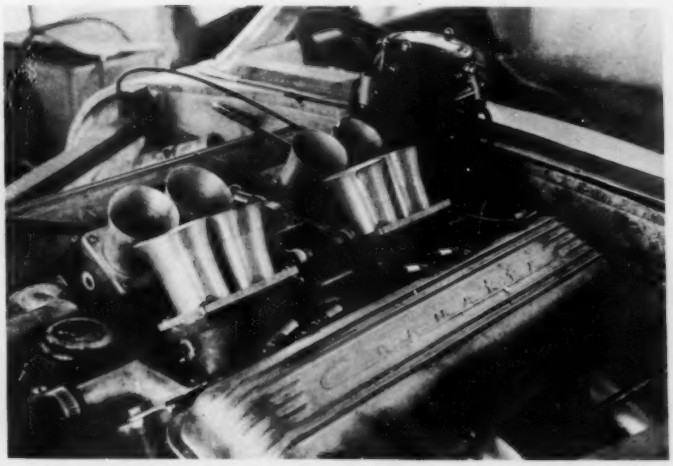
Bill's attitude toward his interest is best described by the rather solemn phrase, "total involvement." In 1953 when he and Anne were married, his hobbies were photography and "ham" radio and there were cameras, antennae, developing tanks, enlargers, transmitters and receivers all over the place. On their honeymoon to England, they bought a green MG TD. And as sure as acorns become giant oaks, after they got back home, Bill ran it in a race near Ottawa. When he discovered he'd worn out a full set of tires in one event, he realized that even his job as a guided missile technician didn't pay well enough to support this activity.

The MG was followed by a Singer and then by a Q-ship-like Hillman Minx. Bill had shoe-horned a Ford V8-60 into it! But they were none of them fast enough or cheap enough for Bill to be happy with so in 1954 he started on what would later be known as the Jowett version of the Sadler Mk 1.

Total involvement means that in the fall of 1956 he and Anne and their two daughters upped stakes and moved to England where he worked for John Tojeiro as a designer. Like coals to Newcastle, he took his Mark 2 with him and in the following year, living in and out-of a converted English van, they took in as many English race meetings as they could manage. Home again a year later, he convinced his mother and father to stake him while he endeavored to establish himself as a constructor of sports cars. His parents own and operate Sadler Auto Electric, a highly prosperous firm, and perhaps it's not accurate to say that he started from scratch. They gave him free access to the firm's well-equipped shop plus the exclusive use of the basement in which he started construction of a production prototype early in 1958. When you realize that a truck-size Clayton Dynamomotor is one of the items of equipment, you'll appreciate that this is sort of a back country version of GM's Tech Center, and just about an ideal place to build a special.

A year and a month ago in SCI, we chronicled Bill's series of specials. They were a varied lot, three engines having dwelt in the first chassis, the last of which graduated to his second one to become the subject of Clarence La Tourett's detailed cutaway before being clothed in a new aluminum body. This Mark 2 car was campaignd on an extremely limited budget with considerable success. But the car was also built on a budget, using lots of second-hand parts, and it kept coming apart just as it would really get going. Probably its biggest moment was at the '58 Montgomery SCCA Nationals, where Bill pushed it in front of *both*

Ram-tubes highlight the slanted entry to Stu Hilborn's newest injection set-up for Chev V8s. The towering Spalding distributor required a hole in the hood, so it will soon be moved to the front of the engine, where it will be driven off the crankshaft nose.



Bill Sadler, a 27-year old Canadian, has designed an answer to Ferraris and Scarabs. Reproductions soon to be available to enthusiast market.

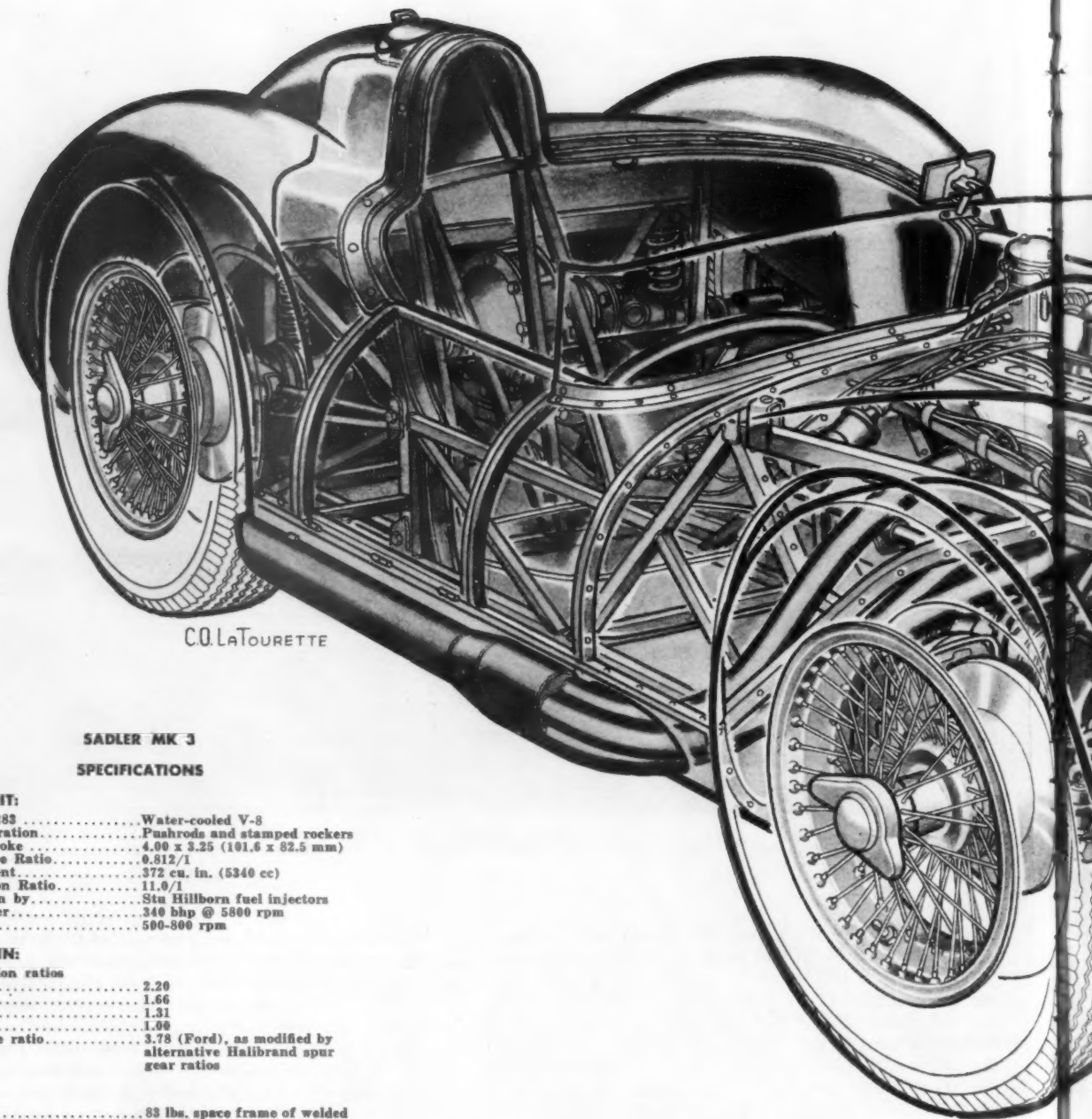
Windshield on Mk 3 is even with Mk 2's hood. Driver's eyes are about level with fender crowns.

Scarabs and *both* Lister-Jaguars. But it was only a moment, because one of the universal joints in the rear axle gave up.

This meteoric performance, together with a solid win at the Watkins Glen Classic, was enough to catch both the eye and the enthusiasm of Earl Nisonger, president of one of the oldest firms in the imported automotive business. His first step was to have Sadler replace all the running gear on the Mark 2 with new parts, brand new. His next was to put Bob Said in the driver's seat and have him race it in the then-embryonic USAC road-racing program. Undaunted by a relentless run of ill-fortune, Nisonger then commissioned the crew-cut, 27-year old Canadian to build a completely new car. With two seasons' worth of lessons run past its wheels, one in England where Bill worked for John Tojeiro, original designer of the Ace-Bristol, followed by one in Canada and the Northeastern States, this meant a lot of changes.

In fact, the Mark 3 is a completely new car, but its heritage is evident from the needle-nosed fenders to the Sadler-designed swing axles at the rear. Differences abound, too. The simplicity of the ladder-like, large-tube frame of the Mk 2 has been abandoned for the lightness and convenience of a space frame built solely of square section, seamless tubing, .049 inches thick. This chrome-moly tubing varies in section from ¾ to 1⅛, but no matter what the size, the ever-present flat sides thoroughly simplify the shaping of joints and the provision of brackets. All welds were made with mild steel rod. It's nearly a pure space frame, i.e., a welded replica of a pin-jointed truss with no bending loads at the connections, but more important, as Bill says, "It does its job."

Its job is to hold the working parts of the car together with the least fuss and bother. Given a sufficiency of rigidity, all one can ask of a frame is that it lose weight — and not break. One of the best ways to keep a frame light in spite of its heavy loads is to keep the upper and lower frame rails well separated. Sadler has done this to such an extent that at the front, upper ones are on the same level as the valve covers while the lower ones, 15-inches below, are flush with the bottom of the special twelve-quart sump. Depth is drastically reduced to ten inches at the cockpit sides to combine the legal-size doors and a satisfactorily low cockpit edge with the lowest seating position this side of a toboggan chute. Behind the seats, the upper rails flare upward over the axle shafts with inches to spare so that the coil springs can be attached directly to the frame. An adjacent upright and a truss-like diagonal from the lower rail ensure that spring and shock absorber loads are well distributed into the frame, while a subsidiary framework to the rear serves several minor functions. Outboard it holds the pivots for the body's tail section, inboard it carries the minimal Lucas battery as far aft as possible. Across the entire width



SADLER MK 3

SPECIFICATIONS

POWER UNIT:

Chevrolet 283	Water-cooled V-8
Valve Operation	Pushrods and stamped rockers
Bore & Stroke	4.00 x 3.25 (101.6 x 82.5 mm)
Stroke/Bore Ratio	0.812/1
Displacement	372 cu. in. (5340 cc)
Compression Ratio	11.0/1
Carburetion by	Stu Hillborn fuel injectors
Max. Power	340 bhp @ 5800 rpm
Idle Speed	500-800 rpm

DRIVE TRAIN:

Transmission ratios	
I	2.20
II	1.66
III	1.31
IV	1.00
Final drive ratio	3.78 (Ford), as modified by alternative Halibrand spur gear ratios

CHASSIS:

Frame	83 lbs. space frame of welded chrome-moly square seamless tubing
Wheelbase	86 in.
Tread, front and rear	53½, 51 in.
Front Suspension	Coil and nearly equal wishbones
Rear Suspension	Low pivot point swing axle, fully articulated drive shafts
Shock absorbers	Koni adjustable telescopic inside the coil springs
Steering type	Morris Minor rack and pinion
Steering wheel turns L to L	2½ (being changed to 1¾)
Brakes	Girling discs, A (11 in.) front, B (10½ in.) rear
Tire size	5.50 x 16 front, 7.00 x 16 rear
Rim size	4.5 x 16 front, 5.5 x 16 rear

GENERAL:

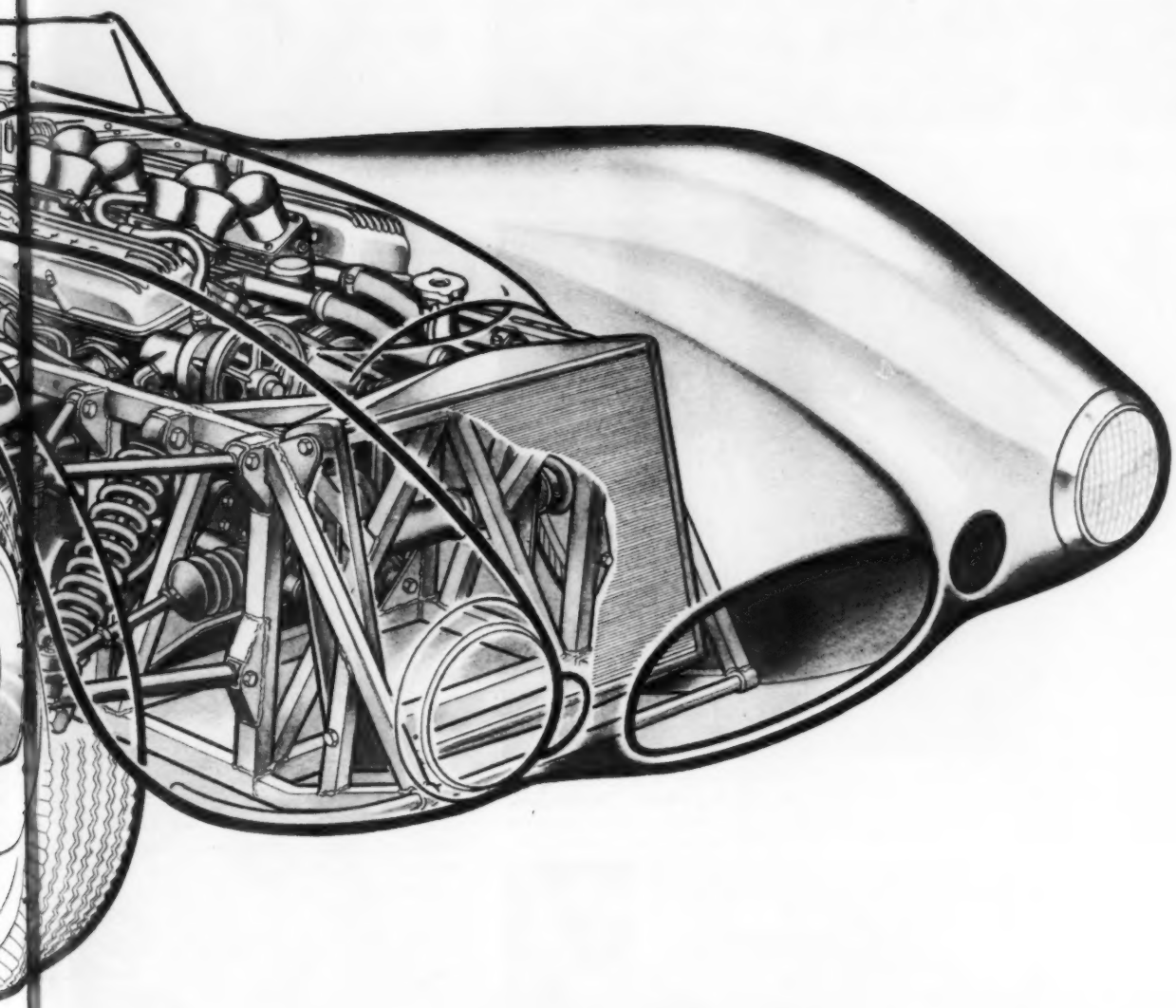
Weight, curb, as computed by weighing all parts	1650 lbs.
Weight distribution, F/R as tested	
Fuel capacity	47½ U.S. gallons

RATING FACTORS:

Specific Power Output	1.04 bhp/cu. in.
Power to Curb Weight Ratio	4.9 lbs./hp.

runs a bumper-like cross piece which should protect the Halibrand quick-change center section from brakeless competitors. Total frame weight, including brackets, is only 83-lbs.

From the front cross-member to the next to last one, the bottom of the frame is only a belly pan's thickness away from being the bottom of the car . . . which is just 4½ inches from the ground. The latter proved to be insufficient when Bob Said burst a tire against a runway marker light at Nassau and the Mark 3 sat down on its frame and slid. Static flat tire ground clearance is about half-an-inch, but dynamically, it went negative for long enough to grind some essentials away.



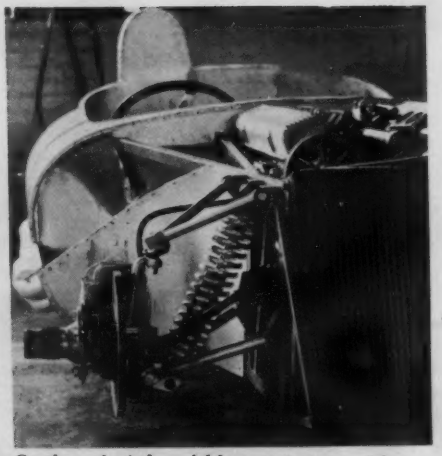
Back in the days when Bill was just another special-builder, one of his guiding principles was, sensibly, "What can I get for cheap?" Availability of components affected layouts, a noteworthy example being the second-hand ENV pre-selector gearbox. Obtained on an even swap against a well-used TR engine, it was a natural for the rearward location adjacent to a frame-mounted final drive center section.

But now, with Nisonger's backing, Bill is aiming at more than "just" a race-winning car, he wants to build saleable cars. Not only are junkie parts out of the picture, but so are unusual, hard-to-get items like that gearbox. Nothing could be more natural than to use the fully synchronized Chevrolet four-speed gearbox and, since the shoe fits, why not bolt it onto the bell housing?

The engine is but of course a Chevrolet. If any engine will steal the title ubiquitous from the Coventry Climax fire pumper, it's surely this Detroit barge pusher. Though Bill has experimented considerably with power plants himself (his raucous fuel-injected TR will be long remembered), he felt that ample power for road racing with equal portions of reliability was available in the bolt-on equipment field.

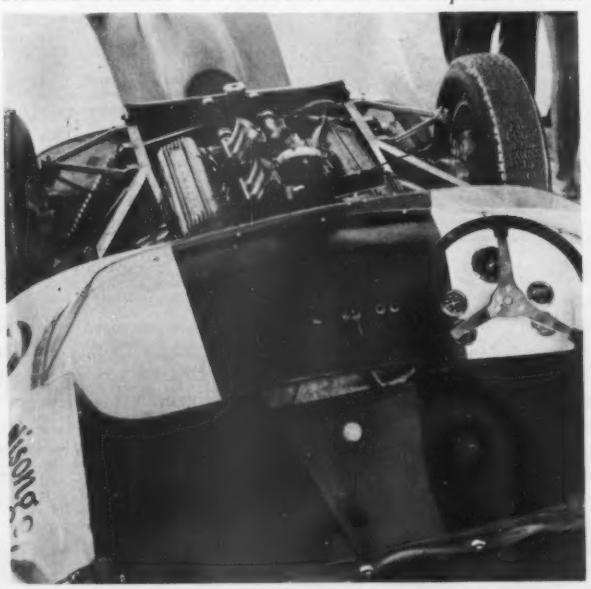
Stu Hilborn's latest angled-port fuel injection unit provides the mix. The olive in this Chevy cocktail is an air-cooled Spalding distributor. It gives a hot spark alright, but

Fred Davies, Bill's right-hand man in the construction of the new Mark 3, helped him build it in only eight weeks.



Outboard of the wishbones, front end is stock Triumph. Special tubular wishbones locate, Morris rack, pinion steer.

Trying cockpit on for size, Bill indicates better leverage achieved by nearly horizontal steering wheel. Transmission and central part of space frame are neatly covered by sheet aluminum shroud which was installed with explosive rivets.



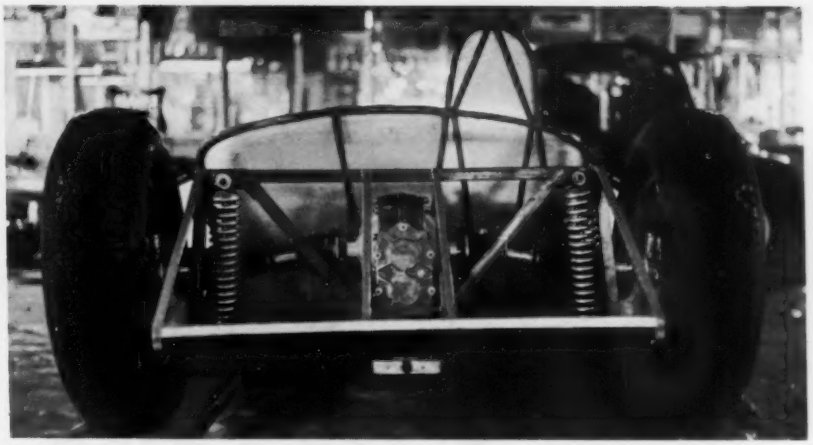
the reason for air cooling is that its coaxial rotors are stacked vertically, making the whole unit a good bit taller than the hood line. They're much like magneto collector rings. Since it's right in front of the windshield, and aerodynamics aren't considered too important on America's sprint-like courses, well, it just sticks up there in front of Bob Said and everybody. Bill discovered last year that as far as class wins are concerned, it's better to enlarge the 283 cu. in. (4640 cc) enough to get over the five-litre mark. This time he went way out. The bore and stroke are now 4.00 and 3.25, ⅛ and ¼ over stock dimensions respectively, making the displacement equal to an impressive 327 cubic inches (5340 cc). At 5800 revs, output is estimated at some 340 horsepower.

At the heart of this engine is a Racer Brown "Super-Torque #2" camshaft, identical to the one chosen by Warren Olson for the Scarab's assault on Nassau. Short, bell-mouth ram tubes admit fresh air, while burnt gasses are expelled through carefully shaped exhaust pipes of 1⅝-inch diameter. The four separate pipes sweep close together as they pass behind the wheel well. Just after they emerge through the body itself, they enter a six-inch long pseudo-muffler that is only 3-inches by 5 in cross-section. These individual pipes vary in length from 30 to 34-inches, measured from the cylinder head to the beginning of the muffler can, the front ones naturally being slightly longer than the rear ones. The lengths were chosen to provide exhaust-tuning but the effect of this small variation is to somewhat spread the usually abrupt boost of power, though perhaps at the cost of unequal loads on the crankshaft. Beyond the muffler extends two-and-a-half feet of three-inch exhaust pipe; its bellowing roar at full throttle makes a diesel tractor sound like a power lawn mower.

But all this is fairly straight-forward and not too unusual. Not so the Sadler touches. Though none of them stick up and scream for attention, there are several items well worth noting.

To ensure an ample supply of oil even during 250-mile events, Bill welded up a 12-quart, T-section pan to close off the crankcase. This provides the same oil level as the standard five quart sump but the

More Girling discs and Sadler-designed hubs are located by paired radius rods, tapered swing arm welded of mild steel.



GMC truck-style Spicer universal joints sprout from speical bearing carriers on sides of Halibrand quick-change differential. Outer joints are Chrysler pot-type. Swing arm pivot bolt is seen through belly pan.

larger volume gives the oil more time to cool before being pumped through the system again.

As on his previous Chevrolet-engined car, Sadler has made a carefully baffled breather pipe so that the extra large supply of oil isn't promptly pumped overboard. The reasoning behind the baffle is this: The fumes from the crankcase, (heavily laden with oil vapor), are pushed to the breather pipe by the pressure of the blow-by past the piston rings. But the breather pipe is necessarily much cooler than the crankcase so droplets of oil condense on its inner surface.

On racing engines, with especially loose fits between pistons and cylinders to reduce friction, blow-by is more extensive by far than it is on touring engines. Instead of draining back into the crankcase, the condensed oil is normally swept overboard by the rush of air. Sadler's ingenious system provides a trap for the droplets by forcing the blow-by fumes to follow a somewhat circuitous path.

Also stemming from his Mark 2 car, tapered shock absorber rubbers are used to mount both engine and gearbox to the frame. They isolate the high frequency vibrations (which only have small amplitudes) without allowing excesses of engine movement as do normal rubber engine mounts.

Bolted firmly together at the bell housing, the engine-gearbox combination has a three point installation. A welded-up, mild steel carrier extends across the front of the engine below the crankshaft center line. It reaches down to the lower frame rails, where cylindrical fittings from shock absorber ends accept the pairs of tapered rubber bushings. Bolts, lying fore and aft, connect this installation to small flanges on the second lower crossmember.

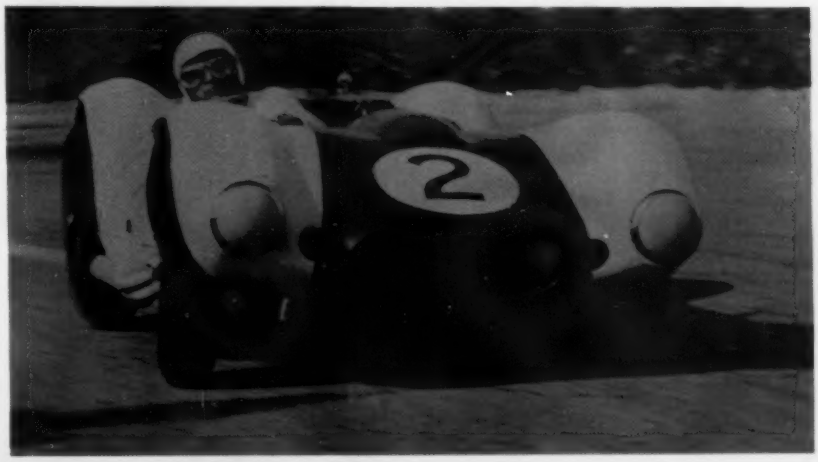
Under the rear of the gearbox extension, two side-by-side vertical studs pick up a pair of spigot or compression-type shock absorber mountings. The attachment is to a central portion of the frame which runs inboard from the front suspension and downward from the cowl section, still tapering inward, and ending in a mounting cradle for the Halibrand center-section.

Between the engine and gearbox, both the flywheel and clutch are aluminum, as is the bronze-faced pressure disc. A single

(Continued on page 56)

Mark 3's Nassau introduction proved meteoric, brilliant but short-lived. Brief as it was, it impressed many, including Stirling Moss.

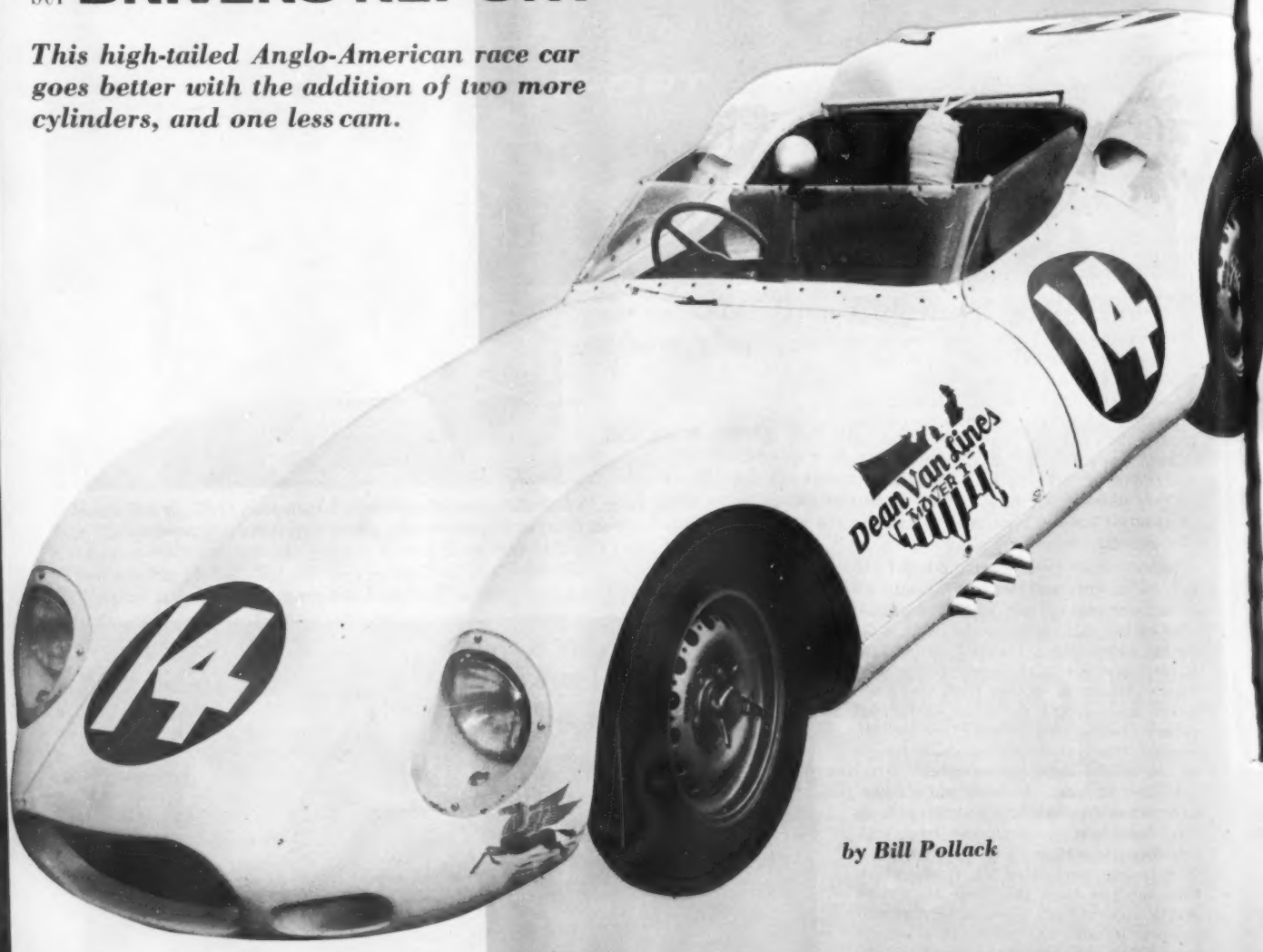
Without anti-roll bar, Mk 3 tilts a lot as Bob Said presses on through fast bend.



LISTER CHEVY

SCI DRIVERS REPORT

This high-tailed Anglo-American race car goes better with the addition of two more cylinders, and one less cam.



by Bill Pollack

AL DEAN, as owner of the Dean Van Lines, moves mountains of furniture each and every year. This occupation earns him — maybe not mountains, but comfortable hillocks of green cash each and every year, which in turn allows him to sponsor spotless Indianapolis-type cars. His knowledge of American racing machinery then is slightly less than encyclopedic in scope.

Knowing all this, I was a little hesitant about talking to Al on the subject of running a sports car. We had talked in the past about sporty cars, but just in a general sort of way. His main objection was "no money." He had said, succinctly enough, "Hell you guys are crazy to stick your necks out for a brass ash tray", and I couldn't say that I disagreed with his thinking.

With the announcement of the Riverside Grand Prix, sponsored by the Los Angeles Times, Al began to delve a little deeper into the subject of roomy race cars. Interest soon deepened into desire and we found ourselves with just two months to select and prepare a car for the big go.

Ferraris sounded interesting, but we could only get a three litre. Both of us felt that we would have to have at least a new 4.1 to be competitive. The West coast Ferrari man had only one of these cars, and he was saving it for Phil Hill. Over and above this Al felt that he wanted something with an American flavor—this thinking brought us to the Lister chassis.

Most of our information on the car came from an SCI article (July 1958), as neither one of us had ever seen a Lister. The machine had an immediate appeal, because it was a type on which we could use some imagineering in the process of bringing it to final race tune.

Knowing the type of car we wanted and finding one for sale proved to be two different stories, however. There were several in the East, none of which were for sale. Our local Lister dealer, Tom Carstens, of Tacoma, had a car but was reluctant to part with it. Tom was a good friend of mine. He had owned the big, black #14 Allard which I drove in the early '50s. This combination overawed quite a few competitors on the West coast in those days. The Lister was another matter, however. It had become a community project, with many of his friends devoting countless hours to preparing it for active campaigning.

Some of the things they had done to the car included changing the fuel system, strengthening the front end and building in a removable firewall to make engine swapping simpler. Needless to say the Carstens crew were enamoured of their machine—especially since it had won its first time out. Attrition tactics on my part broke Tom down and he agreed to sell us the car.

The Lister had been originally fitted with a Chevy engine, but we purchased it without a power plant. This would allow us to try some of our own ideas on how to make a Chevy produce large gobs of horsepower. The engineless Lister was shipped to Bruce Crower in San Diego, to be powered and pampered in time for its Riverside debute. With a six-week time limit Bruce, and his right hand man Dave Snyder, were mighty busy race car constructors.

Crower, a familiar man around Indianapolis in the last few years, was new to sports cars. This didn't disturb him at all, however. It was his contention that a race car built-for-two was no different than any other built to run. The finished machine more than proved him right.

After many sleepless nights the completed car arrived at Riverside the day before the race. An even bigger cliff hanger was provided by the appearance of our tire supplies on race day! My first look at the car all in one piece brought home the fact that Bruce's ideas on exhaust systems consisted simply of not having any. The Lister had eight straight stacks sticking out the side and that was it. It looked and sounded like an old P-40. Bruce had just recently built up an engine for a rail job that had clocked 162 mph — so that I couldn't argue with him about what constituted an adequate exhaust system for a competition engine. Besides, the mill had been completely set up on a dyno.

It is always an interesting feeling when you take a new race car out for its first canter. The Lister-Chevy was no exception.

I sat in the car and Bruce checked me out on the starting procedure. We were running carburetors, so firing up was relatively simple. The engine started at first touch of the button, with a soul-stirring "ripping cloth" sound. It was very responsive to the slightest throttle pressure. A gentle toe tap sent the revs racing around the tach. It felt, in fact, like Bruce had forgotten to include a flywheel. This was almost the case, because the flywheel being used was all aluminum with an aluminum clutch and pressure plate — the net result being that the drive train was very light.

I eased the car into first and pulled out on the course. My instructions were to turn a couple of slow laps to get all the parts up to working temperature, then to gradually increase speed. For this first lap I held the car to 3000 rpm as I checked for oil leaks and just generally enjoyed having a fine machine under my command. With Morris Minor rack and pinion steering, the Lister was one car that you had to drive with your fingertips. This delicate steering was the first thing I was aware of during my three slow laps. Everything felt right so I decided to try a fast one. I held it at 5500 rpm down the chute just to make sure that everything — like brakes and such — would work. After checking, I turned her loose. The big telltale-equipped tach read a good solid 6600 as I boomed into the descending first quarter of the mile-long Riverside straight. Even MGs can break the magic century on this portion of the course. We had to be competitive with a 169 mph posted by the 4.9 Ferrari if we were to go motor racing on "the" day.

As soon as I had taken one or two fast laps our first problem became apparent. At speeds over 150 mph we got quite a bit of lift in the front end. Carroll Shelby, who had been standing on the course, said that it looked as though the front was going to come completely off the ground. In fact it was lifting a good eight to ten inches. This worried me because it cut down visibility from the car just at a point on the course when you wanted it — not to mention what it did to the steering. Later, I talked to Masten Gregory who had driven Listers in Europe. He claimed that they had had the same problem on the ultra-fast Arvus circuit in Germany. The factory solution was to raise the rear of the car about two inches to spoil the airfoil. They also altered the shape of the front fenders to achieve the same effect.

Since our discovery of this difficulty occurred on the Saturday before the race we couldn't go to any major changes to correct it. The only positive solution would have to come from the driver — in this case me. I would have to compensate for the 10 or 15 mile-an-hour breeze that always blew across the straight at Riverside. Extra compensation would be needed when the car shot out from the lee of the two cliffs that border a good part of the chute. To make it still more interesting the Lister at speed would not accept directional changes immediately. In fact, if the driver was pure in heart, and had the nerve, he could make strong motions with the steering wheel at speeds over 150 mph. This is not recommended at lower speeds, in fact it's not recommended at all.

A secondary problem that came to light during our shake-down cruise was which tires at what pressures best suited the Lister. Riverside is a rather unique course. It has a straight that is over a mile long, starting with a good downhill run in. This fast section is bounded on left and right by two cliffs. The road here is at least eighty-feet wide with a white stripe down the middle to help you keep reasonably well aimed. The end of the straight is a long banked downhill turn that leads into the pit straight. This can be entered at about 80-90 mph, but it is best to come in with a little less velocity than that and gradually build to this optimum. The course is smooth surfaced making it easy on tires, but not so good for providing big-bore machinery with lots of bite coming out of the various corners. The problem then was to obtain the right combination of tires, pressure, engine power and gearing to get the best performance all around the course — including the esses and the one hairpin at the top of the circuit. The engine had been designed to deliver its power at 4600 — at which point it came in with a gratifying thump, and stayed in up to 5600 rpm. At 6000 it leveled off till you reached the danger point at 6600 rpm. These rev points may sound low, but we were running a big 350 cubic incher, with three-and-a-half-inch stroke. You just don't turn these big ones as fast as a stockstroke Chevy — some of which will go to 8000.

For tires we had the new soft Engleberts, and we had just about decided to go to larger shoes at the rear. This would give us a slightly higher top speed, and spoil the air flow to help keep the nose down. The ultimate decision on tire sizes then was 7:50 on the rear wheels and 6:00 on the front.

Tire pressures were determined by cut and try methods — as was handling. For example, turn six at the top of the course could be taken in either first, second, or third gear. By using the stop watch we determined that we could not improve on

Note stiffening webs welded to lower wishbone and around pivot points of upper arms. Anti-roll bar is attached to lower wishbone by rod and clevis joint.

The office is comfortable and functional . . . for the driver. Passenger would have to avoid shift linkage to Corvette four-speed gearbox.

our times through the corner in first or second. We got a lot of wheel spin, made lots of noises, but simply did not go any faster than when I used a cautious application of power in third. Incidentally, because of the great amount of power that came in at such low rpms we were able to lap Riverside with only two gear changes per lap — one up and one down. This was on the major fast straight where we would use fourth, the rest of the course being driven in third.

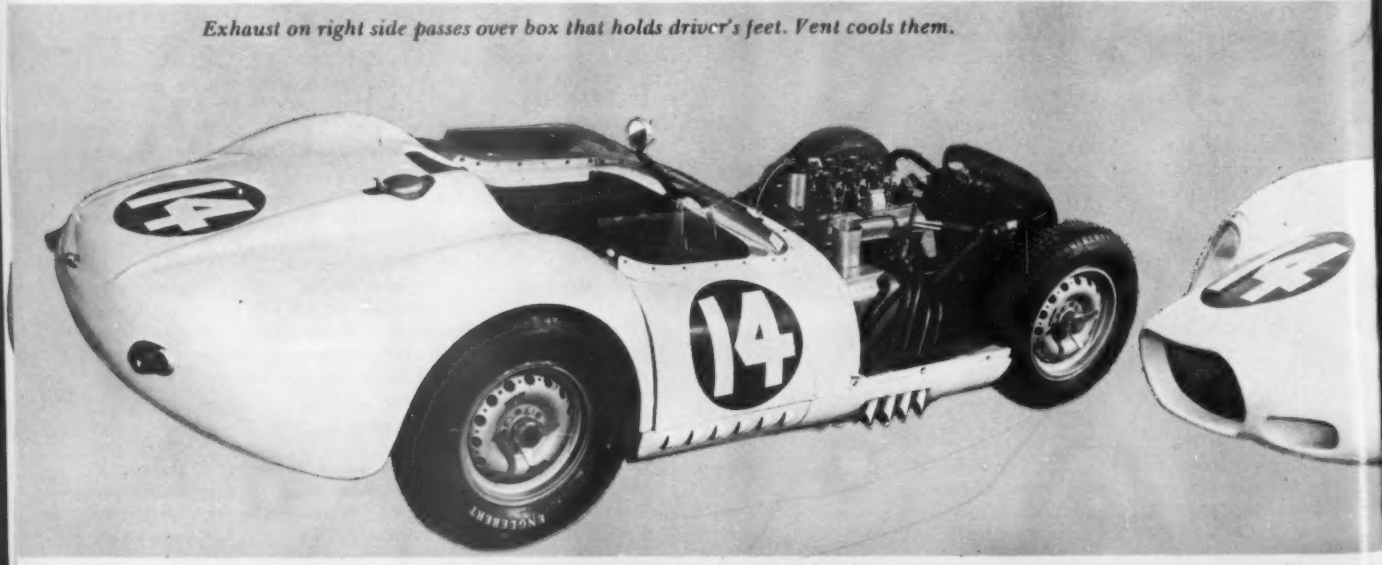
With a long, busy Saturday behind us Bruce towed the car back to San Diego for a quick look at the main and rod bearings to make sure that everything had gone according to plan. During practice the engine had been running a little on the warm side, so Bruce took the time to fabricate baffling to force more air down and through the radiator.

Race day dawned hot, dusty and full of people. There were lines from the gates as far as you could see — later stories of waiting over an hour to get in were prevalent. We had a good starting position in the front third of the grid. The only problem was how to stay alive in the terrific heat until race time at two o'clock. I finally found an air mattress and crawled under the truck. As our starting time approached I once again went over in my mind all of the things that we had done, and mentally double checked all the things that can come loose or go wrong during a race. I was anxious to try a new brace that we had made for my shoulder. The Lister does not have bucket seats, and I found that I had to grip the wheel hard just to stay in the car on right hand bends. We had made a gadget that slipped in behind the seat and formed pad or brace for me to lean against. Little things like this allow the driver to relax and drive the car.

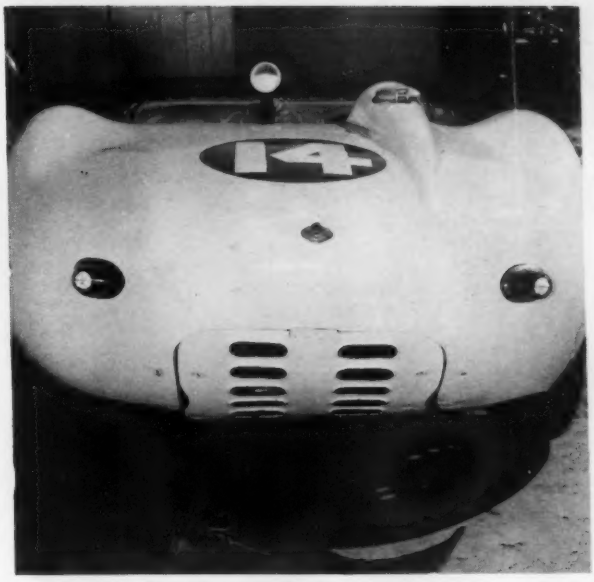
The start was the usual dog fight of snarling, straining machines. The Lister proved a surprisingly lithe tool for this sort of cut and thrust work. Using the car's acceleration I managed to pick up half a dozen or so places by the time the pack got to the top of the course. After eight or nine laps I noticed that the temperature had climbed to the danger point. A decision had to be made — whether to slow down or come in. I voted for slowing down. In an hour or so a good portion of the 40-gallon fuel load would have been sucked through the carbs, and the outside air temperature might drop. With this tactical plan laid out I drove by the heat gauge — keeping it just under 215° F.

The cars quickly strung out, and I found a niche that seemed okay for both man and machine. It was at this point that one of Carsten's warnings about the car was brought forcibly to mind. The Lister is fitted with Girling disc brakes, and unless a specially recommended — and almost impossible to find — hydraulic fluid is used there is a loss of pedal. As Tom

Exhaust on right side passes over box that holds driver's feet. Vent cools them.



Stroked Corvette engine fits well in Lister chassis. Pipes would look more at home on a drag strip, but they seem to work. Noisy!



Air taken in at scoops located in top-front surface of rear fenders passes over brakes and exits through slots.

described it, "the fluid boils, and there are no brakes, but if you pump fast enough they come back". Coming down into the 9th turn I had the indescribable feeling of backing off at 150 mph or so — and finding no brakes. My right foot was a blur as I tried to pump the stop pedal back into usefulness. The Lister was rapidly running out of road, and when something did happen it all happened at the right front brake. The inevitable result was that I entered the bend at an impossible speed.

When this happens to you there is only one thing to do. Drive through the corner as though you didn't know that it was impossible to make it. Sometimes, if the gods smile, you can make it. This, however, was not one of those days. I went into a long, slow spin that ended with the car on the inside of the course facing in the direction of traffic. I didn't even lose my place — but there are a few extra greys in the old thatch.

(Continued on page 59)

Pollack talks to Chris Christian of Dean Van Lines.

LISTER-CHEVROLET

PERFORMANCE

TOP SPEED:

Fastest time through traps at Riverside	161.9 mph

ACCELERATION:

Standing ¼ mile	12.6 seconds
Speed at end of quarter	116.6 mph at San Diego

FUEL CONSUMPTION:

During Riverside Grand Prix	5.6 mpg

SPECIFICATIONS

POWER UNIT:

Chevrolet 283	Water-cooled V-8
Valve Operation	Pushrods and stamped rockers
Bore & Stroke	4.00 x 3.50 in. (101.6 x 88.9 mm)
Stroke/Bore Ratio	0.875/1
Displacement	352 cu. in. (5780 cc)
Compression Ratio	11.2/1
Carburetion by	Six Stromberg 48 down-drafts
Max. Power	330 bph @ 5600 rpm
Max. Torque	322 lbs.-ft. @ 4600 rpm
Idle Speed	950 rpm

DRIVE TRAIN:

Transmission ratios	
I	2.20
II	1.66
III	1.31
IV	1.00
Final drive ratio	3.31

CHASSIS:

Frame	Welded tubular steel frame
Wheelbase	92 in.
Tread, front and rear	52 and 54 in.
Front Suspension	Parallel, equal length wishbones, coil springs
Rear Suspension	de Dion tube, four trailing arms, coil springs
Shock absorbers	telescopic, in unit with coil springs
Steering type	MG rack and pinion
Steering wheel turns L to L	2.7
Turning diameter	60 ft.
Brakes	Girling 12 inch disc, quick-change pads
Tire size	6.00 x 16 front, 6.50 x 16 rear

GENERAL:

Length	162 in.
Width	62½ in.
Height	39 in. (27 in. at cowl)
Weight, as tested, curb	1790 lbs.
Weight, laden	1950 lbs. (one passenger)
Weight distribution, F/R as tested	52/48
Fuel capacity	42 U.S. gallons

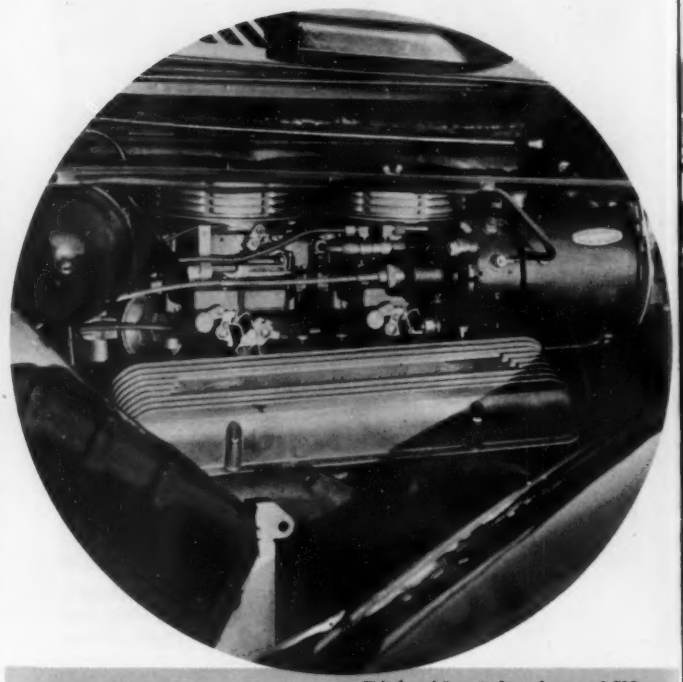
RATING FACTORS:

Specific Power Output	0.94 bhp/cu. in.
Power to Weight Ratio, laden	5.9 lbs/hp
Piston speed @ 60 mph	1400 ft./min.
Speed @ 1000 rpm in top gear	24.9 mph

"It's just a TD."

MG CHEVY

by Philip Peyton



Right side of shoe-horned V8.

ANYONE WILL ADMIT that a stock MG-TD just doesn't *go*. A really sensible man would simply say, "Buy a Twin Cam." But TD owners are a special breed — whatever the reason may be, *they like TD's.*

There are undoubtedly, more recipes for hopping up an MG than there are for chowder, from stage tuning right on up. Here's a new one: take a tired TD, a Corvette V-8 engine, an extensive mechanical background and a passion for speed. Stir thoroughly in a well-equipped shop. The results will be a good-looking, functional machine that betters 6.5 in the 0-60 range, easily tops 105 in the quarter mile, and just surprises the living you-know-what out of Thunderbirds and Golden Hawks.

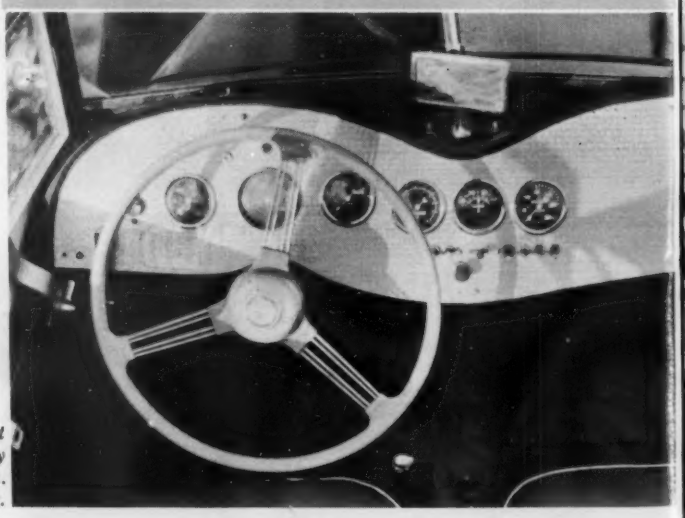
The perpetrator of this hoax on "sporty car" owners is a mild-looking, middle-aged, multi-talented machine shop operator from Mineola, Long Island, named Brett Nichols. Brett makes his living manufacturing display pieces for large corporations, and is an auto-enthusiasts dream type. He'd sooner talk about Bugatti's than anything else.

The conception of the MG-Chevvie graft was formulated back in January, 1957. Brett was approached by an acquaintance who was getting poor performance from his TD. Nichols had been toying with the possibilities of a big OHV engine conversion in a light, well-built roadster, and agreed to take the "load" from his unappreciative pal for $235. He pulled the engine, transmission, rear end and instrument panel, and sold them to the local Morris garage for $200. The cost of the purchase was therefore boiled down to a remarkable $35.

Brett called Bill Frick, an associate of Phil Walters, who used to drive Briggs Cunningham's brutes and who raced in the East under the name of Ted Tappett, and who specialized in putting Cadillac mills in Fords. Through Frick, Nichols was able to locate an almost new, straight-stick Corvette engine that had recently been displaced by a husky Cadillac.

With all the ingredients assembled, Brett began the long, involved process of turning them into a "good-looking, functional machine." After some preliminary measurements, he found that the three-speed, close-ratio transmission and the 265 inch Corvette engine would fit into the MG frame, although considerable alteration would be necessary.

HOW TO TURN A TD INTO A TAIL-WAGGING TORNADO.



Suitable speedometer gears could not be found so velocity is determined by calibrated card under Corvette tach. Other gauges are stock Stewart-Warner.

Left side of MG-Chevy

Bulge in bonnet side is only hint that four more cylinders have been added.

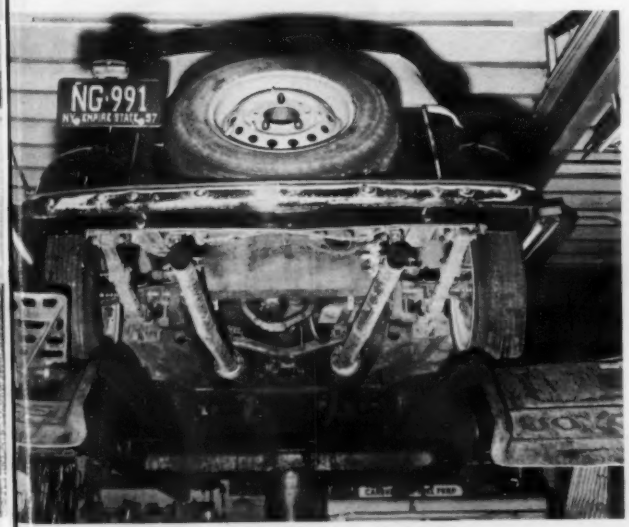
The first step was complete disassambly of the MG. The radiator, front fenders, body and cowl were removed, leaving only the front suspension and rear axle intact. When the Corvette engine was lowered into place, two problems arose. The MG brake and clutch pedal box was in the way of the left rear engine mount, and the Chevvie starter interfered with the right frame wall by about an eighth of an inch. Brett removed the pedal box and ground the frame slightly to clear the starter. Front and rear engine mounts were fabricated of 3/16 cold-rolled steel and welded to the frame, allowing room for ½ inch thick rubber vibration-absorbing pads. The tubular cross member serving as a rear engine mount for the MG engine was cut out about 2 inches from the frame rail on each side, and a new curved member was fabricated to go under the Chevrolet transmission. A T-cross section, additional cross member was made and welded in place for the Chevvie tailshaft support.

The lowest gear ratio obtainable to fit the MG rear axle housing was 4.55 to 1, and even at that the ability of the MG parts to stand the strain was questionable. So the whole rear axle assembly was changed. Bill Frick contributed a 1954 Studebaker Commander rear axle assembly to the project.

It was necessary to make the tread of this axle 4 inches narrower, which would still leave the rear tread one inch wider than that of the original MG. Since the Studebaker axle is not symmetrical about the drive shaft center line, the axle-housings were cut 3 inches outside the center section forging; then 2½ inches were cut off the left hand housing and 1½ inches off the right hand housing. Heavy wall tubular sleeves were made to fit over the outside of the axle housing, slipped over the 3 inch ends which had been left on the center section forging, and the shortened axle housings were inserted in the sleeves. After close alignment, the whole assembly was then rewelded.

A new right hand axle was made by using a 1953 Studebaker axle (¾ of an inch shorter than a '54), cutting off ¾ of an inch from the inner end and remilling the splines an additional ¾ inch. On the left hand side it was not possible to do this since the shape of the axle forging did not permit a 2½ inch reworking. Therefore, a new axle was made from an old truck axle bought in a junkyard. A '55 Ford carrier and spider gear assembly (interchangeable

(Continued on page 58)



Big-bore pipes handle exhaust gases from 283 cu. in. Chevy engine. Back axle had to be fabricated from Ford and Studebaker parts.

OLD FERRARIS NEVER DIE
THEY GET CHEVVIES STUFFED INSIDE!

FERRARI CHEVY

by Robert Lee Behme

FROM BANGKOK TO BANGOR, the name Ferrari has long had a magic ring. Around the world it has been synonymous with invincible speed and power. To the man in the gallery at sports car races, the name conjures up the image of incredible acceleration and unbeatable cars. The few brave experts who tried to explain that these adjectives were applicable only to the Grand Prix and sports-racing machines were laughed at, or at best, ignored.

The unpleasant truth is, however, that Ferrari makes hot cars and Ferrari makes comfortable cars. Seldom have the two elements been combined. The comfortable cars, the kind running loose on city streets, have been powered usually with small engines, hot enough for their small size, but hardly equal in go-ability to big-cube monsters.

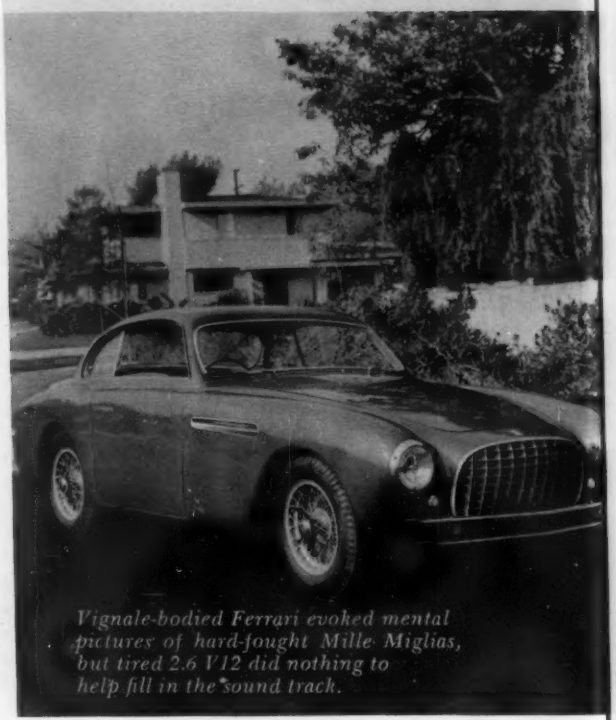
In Malibu Beach, California, an exclusive, money-green settlement north-west of Los Angeles, Benjamin Bok, a slight, studious composer purchased a used 1951, 2.6 Vignale-bodied Ferrari coupe. He had great expectations, seeking the truthful ring of power under the handsome, custom body. This sort of thing is important in Malibu where a splendid car in front of the garage is worth two swimming pools in the yard. When Bok found that the small V-12 was comparable only to other small engines, having barely the power to pull an olive from the nearest sun-kissed martini, he was understandably crestfallen.

Bok is a man used to the attainment of what he wants. He liked the design of the Vignale body and the appointments of the leather-rich interior. He liked the suspension and the handling. So he took his car to Warren Olson, a mechanical alchemist noted for providing proper solutions to the many ills and problems which beset sports cars and their owners. Olson had indeed an answer and his answer was Detroit-like in its simplicity.

"No matter who makes the car," Olson told Bok, "when you want power, you want inches."

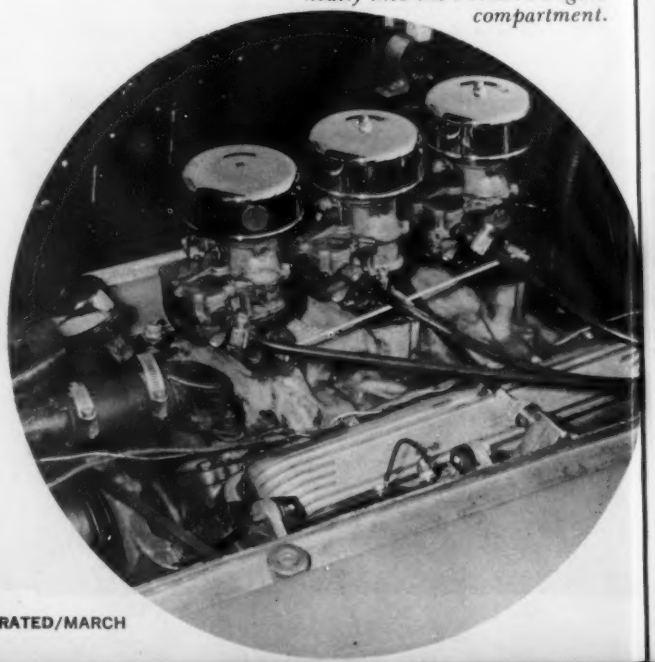
With this in mind, Olson took out the 2.6 engine and replaced it with the engine from a 1957 Corvette. Running over 4.6 liters in displacement and modified to the extent of carrying three Stromberg 97 carbs and a reground cam, the V-8 puts out nearly twice the power of its 2.6 liter predecessor.

Placed as far back in the engine compartment as could be, the front of the Corvette engine is four inches further



Vignale-bodied Ferrari evoked mental pictures of hard-fought Mille Miglias, but tired 2.6 V12 did nothing to help fill in the sound track.

Inches, and plenty of them, proved to be the answer. Detroit's cast-iron threat to the mills from Modena nestled neatly into the Ferrari's engine compartment.



back than the admittedly longer V-12's was. New motor mounts were built from steel plate to fit the Corvette engine to the Ferrari frame. The stock exhaust system was modified slightly to fit around the steering column, a small section near the center being cut out on one side. A larger capacity radiator was fitted up front. Since the body was designed around the smaller, lower engine, it was necessary to install a header tank high up on the inner fender panel to ensure that water passages in the head would stay full.

Olson fitted a four-speed Corvette transmission, a natural for this engine, though it was necessary to modify the linkage and to install special transmission mounts. The reverse shifting arm was turned over to fit around the frame members that came too close.

Lest all the new-found torque bust the final drive wide open, a '56 Ford center section was grafted between the desirable Ferrari hubs and brakes. To avoid unnecessary wheelspin, a limited slip differential was used. Connecting all this with the gearbox is a shortened, rebalanced Corvette driveshaft.

Changing the transmission created two more problems. The clutch, in order to be easily connected, had to be hydraulically operated. (The Ferrari has a right hand drive, but Chev gearboxes have clutch arms on the left.) Olson installed two hydraulic cylinders from Ford pickup trucks, mounting the master unit on the right frame and the slave unit on the left frame, blocking the unused openings. Brass tubing was attached to the frame and flexible hose links the tubing to the cylinders. Inside the body, it was necessary to modify the floor tunnel to fit around the beefier gear box.

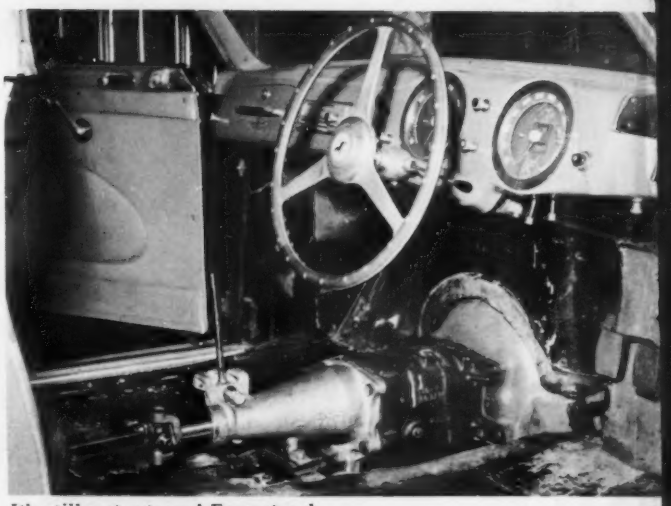
Shortly after the swap was completed Bob drove into the Chevrolet agency in a small California town for an oil change.

"We don't work on foreign cars," the lone mechanic announced, scratching his head in wonderment.

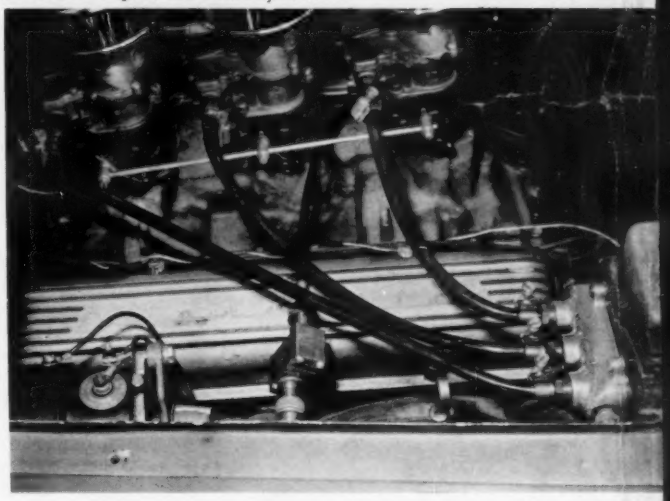
"This isn't a foreign car," Bok said soberly, "It's a Chevrolet."

The man took a quick look under the hood. There, he recognized the familiar outline.

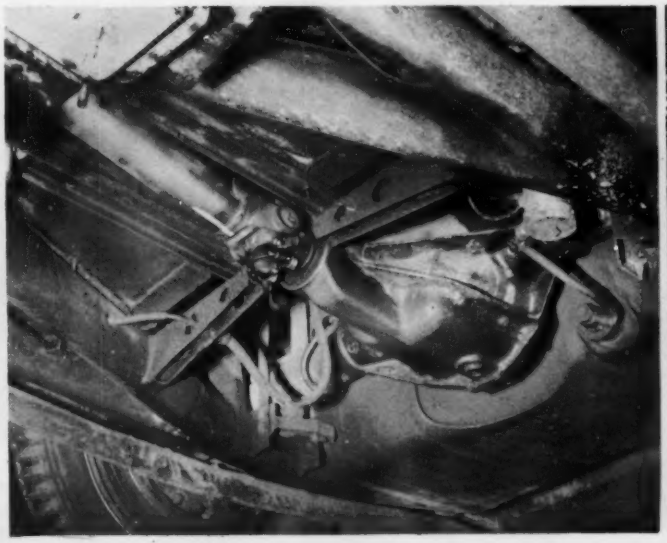
"I'll be darned," he said, "have those foreign fellows finally come to their senses?"



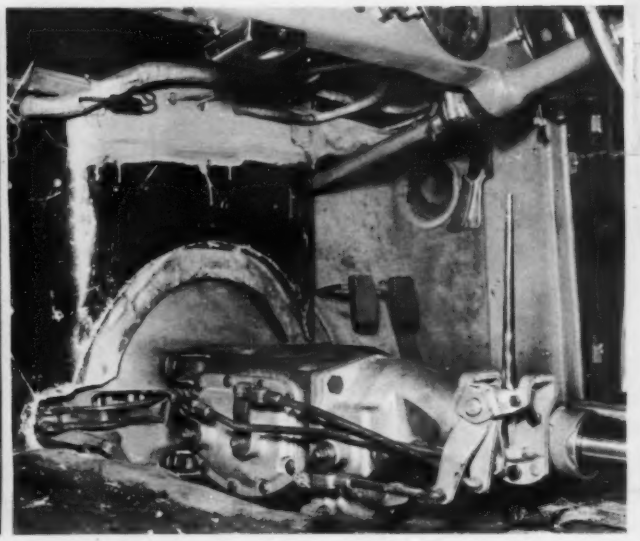
It's still a sports car! Four-speed Corvette box sits only a little higher than original cog case. Shift linkage had to be reworked to clear frame.



Enzo would probably turn purple, but that '56 Ford differential stands up to the Chevy's torque a little better than the original equipment.



Engine (above) runs three Stromberg 97 carbs, and reground cam. Reverse link (below) on four-speed box was turned over to clear chassis frame.



JAG CHEVY

It's a tight pinch if you want that last inch

by George Moore

It may not have twin cams, but it does have twin cylinder heads. Chevrolet V8 fits like it belonged in strictly race "D" type chassis.

THE MORALE of the British motor car industry received an auspicious boost in 1954 simply by having Sir William Lyons deftly lift the mantle covering his newest contribution to automobile racing, and display a vehicle as revolutionary in design as the one presented by Mercedes in a day when solid axles and elliptical leaf suspension still held sway.

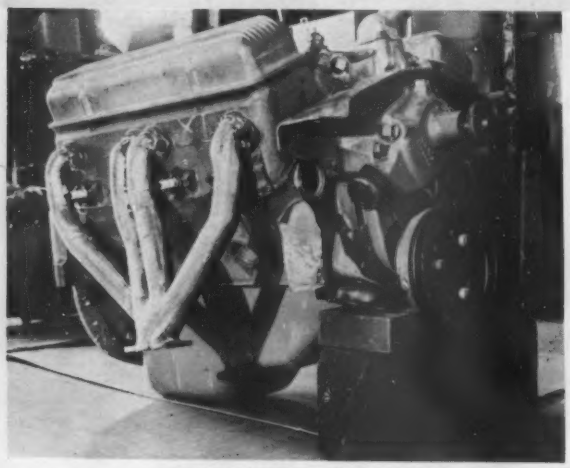
It would be nice to say the newly introduced D Jaguar was taken to Le Mans, swept the field in a blaze of glory, and lived happily ever after. However, such was not the case. The D was beaten by a Ferrari. To be sure, it was five litres against 3½, and the race was run under continuous rain conditions, which meant the Ferrari's brakes and transmission were not put to their most severe test. But the English did lose, finishing second at an average speed of 105 mph.

Some months after the '56 Sebring race, the third place winner had its engine come unstitched due to over-revving. General Motors was in the market for a D at the time, so the car was shipped to Detroit. Supposedly, Chevrolet Division wanted to drop an experimental engine into the space left vacant by the exploded six-holer, but for some reason, the transposition never took place. What caused the Division's discontinuance of their efforts is a matter of much speculation. They may have discovered their own four-speed gear box wouldn't go in without revamping the front suspension system, or possibly the promotion of the SS canceled out all thought of using a foreign chassis. Ultimately, Ensley purchased the automobile, which had not been touched.

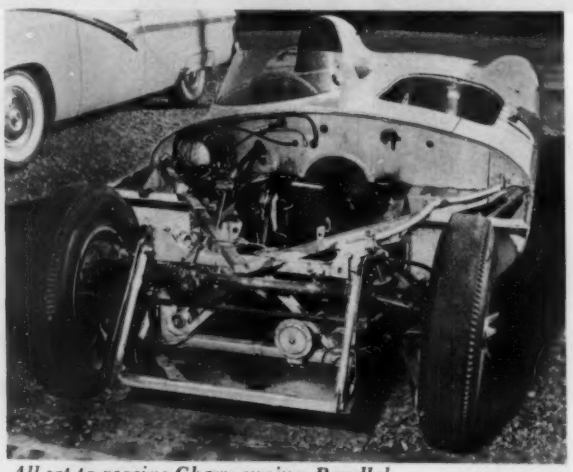
When swapping an in-line engine for a V8, space limitations generally cause a certain number of problems. This was the case with the proposed Jag-Corvette, and while solutions were not right at hand, they certainly could be found. A few tight squeaks developed, but some rule-of-thumb engineering in the shop of race-car builder, Joe Silnes, resulted in a swap which could pass for an original installation.

As every student of the D knows, the front end compartment is much like an open book. Everything is relatively flat and spread out. With the work area laid bare by removing the integral hood and fender skin, radiator, oil tank, and hydraulic lines, there seemed to be space to burn. But a measurement of the length and breadth of the hole brought home the fact it was going to be close to a shoe horn fit. By laying a tape measure across the intake valley, the overall width from the outer edges of both manifolds was 23-inches. Overall length from rear adaptor plate to front was 25-inches. Adding a bit of length for the thickness of the adaptor plate, the outer dimensions were almost square at a plane about the level of the manifolds, which proved Ed Cole, the present head of Chevrolet, had his thinking cap on when he laid this baby out.

The original D departed from orthodox



Hand-formed header pipes were necessary to clear the edges of the Jag's toeboard. Plugs, however, come too close to hot pipes for painless, fast removal.



All set to receive Chevy engine. Parallel chassis struts have been bowed out to clear edges of the V8's manifolds. Steering column was moved for same reason.

Growth on Jaguar hood is only tip off that Sir William's sizzling six has been replaced by iron-hearted Chevy. With terrific torque on tap car should go.

body and chassis construction by employing a monocoque elliptical center section which had the forward frame section welded to it at several points. The tail section, containing the fuel tanks and spare wheel, was bolted to the back of the center section's rear bulkhead. This principal of construction is extremely expensive, and in case of an accident, quite difficult to repair. Thus, with the offering of the series to private owners, the manufacturer made a major modification by developing a separate tubular steel frame which has the center section bolted to it.

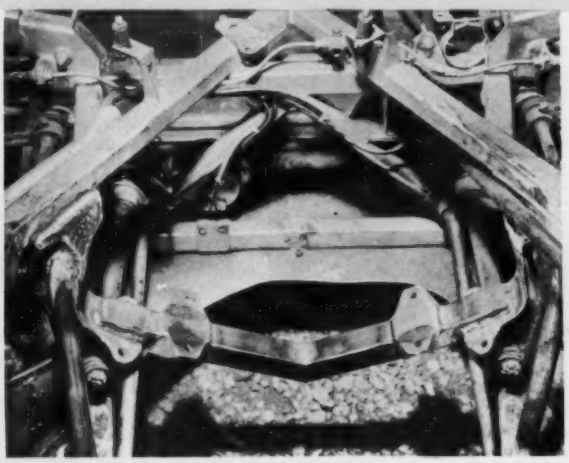
All the rest of the original D design features are retained in the cars that have been sold in this country. And as contained in Ensley's machine, the engine room has two struts running forward from the welded-box center section to juncture points over the suspension members. As the struts lie parallel to the sides of the Jag engine, they had to be cut away in order to accommodate the wider V8. Later, they were replaced by being rewelded at a different angle to their original position. On their forward ends, they are rejoined to the suspension bracing at widely separated points. The finished sub-assembly resembles something of a spread out "Y" effect.

To find the proper height of the engine in the chassis, the drive shaft was lined up with the centerline of the crankshaft, and even then, additional positioning was necessary before Silnes was satisfied with the engine's location. By trial and error, he wound up by dropping the front end of the block a bit to achieve better alignment with the shaft, and setting the block back in the frame so the mounting pads were in line with the Jag mounts. The fabrication to connect these two required some sleight-of-hand with torch and saw, but before getting into that, the job entailed more cutting on the engine compartment's sheet metal.

Even with the naked eye, trouble could be spotted in getting a manifold to fit into the right side of the compartment, throwing the whole front placement of the engine in doubt. The steering shaft on a D is split approximately in the middle by a universal joint, and while there is nothing objectionable about this feature, its position on the right side caused it to lie in the way of the manifold. There was no alternative but to chop away a portion of the box section and move the shaft ¾-inch to the right. The extra clearance slightly increased the angle between the two half-shafts, but not enough to create any kind of binding action at the U-joint. A gusseted L-shaped plate was made to hold the joint, then all that had to be figured was a means of getting a manifold between the block and side of the driving compartment's toe-board.

Silnes knew that he could not go out and buy an exhaust system to fit the cramped space. That left only one other thing to do — build header pipes.

(Continued on page 60)



Steel bridge adapts Corvette engine mounts to "D" type chassis. Wide V8 posed many problems when used as substitute for slim six.

Joe Silnes works on bracket he built to move steering to right. Extra room was needed for one bank of V8. Swap did not alter steering geometry.

SEBRING: PAST PRESENT

Our first road circuit to be truly International, Sebring

EIGHT SOGGY Florida summers ago the hamlet of Sebring derived its fame from the fact that that it was seven miles north of Kuhlman, five miles south of Lakemont and the seat of Highlands County. Since then Sebring's considerably greater distance from New York, Chicago and Los Angeles has more than occasionally been calculated, and the town has become the early-spring Mecca for the nation's road racing enthusiasts.

Late this March and again next November, the sleepy little town will come alive to strike another one-two blow in its bid to displace Indianapolis as the racing center of the United States. Already the site of the only sports car World Championship event in the U.S. (the March 21 date) it will be the venue for the Grand Prix of the United States of America in November. This makes two Championship GP events for America although the general rule is one to a customer. The other event is the Indianapolis Memorial Day 500 which makes it clear that this very small town has become of considerable importance to others than the local citrus growers and a few Northern golfers.

The abrupt, almost accidental change from a minor citrus center to the noisy port of call for Modenese prancing horses has made the Sebring Fire Department certainly one of the most affluent in history, and is still a cause for wonderment to the town's 7,000 or more residents.

To appreciate the startling depth of the transformation Sebring now undergoes each spring, one must bear in mind that Central Florida is a mighty far cry from the western Sun Coast and the eastern Gold Coast — and still further removed from the jungles of Dade County and Miami. Central Florida Crackers are inclined to view with suspicion, if not downright hostility, residents of the more touristy sections of the state, let alone the minions of Maranello and Coventry.

Since 1951 a lot of that has changed for the good burghers of Sebring. For one raucus week each March an endless stream of sports cars snort and sniffle leisurely around the tree-lined circle in the center of town, the beer stores pay off their year's rent and the town's lone pool hall is jammed with characters not normally found in pool halls. Even when the big show folds up its tent and the pennants are lowered from above the main drag, some changes remain. For example, the local Pontiac agency has taken to peddling foreign cars after four years of bedding down the Ferrari teams.

When the monopostos follow their fendered brethren into Sebring the change should be even deeper. At least that's the fervent hope of the Automobile Racing Club of Florida, the Sebring race promoter. Although the 12-hour sports car race now commands greater press coverage than the Indianapolis "500," Sebring still pumps most of its funds out of the pockets of Floridians, especially those who live within 100 miles of the goings on.

Most of these good folks wouldn't know a Vanwall Formula I from Charles Antell's Formula 9. For that reason the Formula I race was originally scheduled to follow the 12-hour sports car grind one day later on March 22 in order to break the people in gently to the fenderless machines and to draw a crowd already on hand for the more familiar sports car race. Unfortunately for the ARCF's well-laid plans, the manufacturers felt virtually to a man that the March date was too early in the year for an all-out GP. Vanwall stated flatly that they couldn't get ready in time. Aston-Martin with a completely new GP car felt much the same. Further, Lance Reventlow's new GP car wouldn't be completed in time. Since the fondest dream of the ARCF was to have an all-American team in the first Grand Prix of the U.S. that cut it. Just as important, sponsorship money was, as always, dependent on a full field and it looked like no field. No machines, no money. As of now the date is to be early November.

The term "Grand Prix" is bandied about rather freely by race promoters, but this will be the genuine article. It will offer faster, and noisier, cars — a quicker race and less

AND FUTURE

by Steve McNamara

will have a new look when mono-postos start from here.

time in which the helicopter-ride salesmen can peddle their wares. Reg Smith, race secretary of the ARCF, says the 15 to 20 Formula I and II machines will be asked to turn 50 laps around the complete eight-kilometer airport and road course — flat as the proverbial pancake and crammed with brake-burning turns. The big go should end between two and one-half and three hours after the 2 p.m. start — in plenty of time for the local restaurateurs to gouge still another dinner-sized chunk from the fans' pocketbooks.

The ARCF has a much tougher financial row to hoe than the restaurants. It must come up with a chunk of cash estimated as high as $250,000 (and as "low" as $100,000). At its October meeting in Paris the FIA approved the Grand Prix of the USA upon the condition the race promoter prove by Dec. 15 it can come up with the necessary money.

The staggering nut made crucial the FIA's little-heralded decision to award driver championship points to the race. (Incidentally, this is the first time one country has had two championship Grand Epeuves — Sebring and Indianapolis). Without driver points the ARCF would probably have had to kiss goodby to any chances of dredging up a wad of cash that large.

Why? Well, the doings in directors' rooms of oil companies have scant dramatic appeal, but through contracts with drivers and promoters, three or four major firms have a hammer lock on automobile racing. With the prodding of these firms, which want to compete with each other, the FIA is expected to rule its races free-gas events. Gone would be the days when Glutz Gas Ltd. could fill up every car in the race and then beat its chest for powering the winner.

The Grand Prix of the U.S.A. would then be a free-gas event, with drivers able to choose from three or four brands. More important to the ARCF, it would be able to put the bite on three or four firms instead of one. Without those driver points, and consequent international importance, the oil firms would have been considerably less willing to be bitten.

The financial hurdle is high, but it's a safe bet the mono-postos will be roaring in Highlands County this fall. The basis of the optimism is the almost unbelievable growth of the sports car race. What is now the United States' only world championship event began as the modest brainchild of the late Sam Collier. Collier, the son of Baron Collier who owned a suitably baronial-sized chunk of Collier County, Florida, was one of the few Americans to have the sports car bug before World War II. He drove an MG at Le Mans and afterwards was a prime mover in U.S. sports car activities.

Collier, Briggs Cunningham, Alec Ulmann (now president of the ARCF) and some other friends set out to promote a sports car race in Florida. Not wanting to terrify the citizenry with the bellows of MG's and Cad-Allards, they searched for a non-urban site. At an airport five miles southeast of Sebring, a town which sits midway beside the north-south route from Miami to the Georgia border, they found a definitely non-urban site.

With Collier's decision the Sebring firemen began their fast rise to fame and fortune. The U.S. Government leases the airport to the City of Sebring with the stipulation it cannot be used for profit-making purposes. But the city can let the Fire Department, ostensibly a non-profit-making organization, sponsor automobile races on the field. The fire department lets the ARCF run the races. Back in the old days the firemen put up bleachers, took tickets and performed other chores. Now they mostly sit around, count their money and put out an occasional fire.

Collier was killed driving at Watkins Glen in September, 1950, so he never saw the beginning of something which has grown beyond his wildest dreams. The first race, for the Sam Collier Memorial Trophy, ran from 6 p.m. to midnight New Year's Eve 1950 and was won on a handicap basis by a Crosley.

(Continued on page 52)

Racer Brown says:

(Continued from page 31)

improve mid-range torque somewhat but at the expense of lopping a bit off at the top. Correct operating clearances for this cam are .012 in. for the intakes and .018 in. for the exhausts with the engine thoroughly hot and running: A slight but noticeable improvement in mid-range performance can be had by the simple expedient of using a clearance of .018 in. hot on the intakes, which shortens the intake timing by about six crank degrees. Tightening the clearances beyond those specified, in an attempt to gain power on the top end, must be discouraged because the slight gain at the extreme top, if indeed there is any at all, will be markedly offset by poorer performance in the mid-range. Take these as well-advised tips from an experienced hand at Corvettes; I've truly tried them all and then some.

The second cam available as stock equipment is the aforementioned mechanical lifter '56 Corvette type. This one is an entirely different breed of cat. With it and a well-prepared 283 engine, you can climb trees at idle speed with 20 inches of vacuum. The idle is dead-smooth and very quiet and the mid-range torque will tear your head off. This is the cam to use for slow courses. This one becomes rather violently active right off idle and stays that way up to around 5000 RPM. Above 5000, the engine tires quickly due to lack of air and at 6200 RPM very audible valve float makes its undesirable presence known. A valve timing check at operating clearances will show that this cam checks out approximately as follows: Intake opens 24 deg. BTC, closes 78 deg. ABC, duration 282 deg., net valve lift .406 in. Exhaust opens 68 deg. BBC, closes 34 deg. ATC, duration 282 deg., net valve lift .404 in. This reveals that this cam is retarded from "split timing" point by five crank degrees, but it's fine that way so leave it alone. It also shows, as far as duration is concerned, that it isn't too far removed from the Duntov. But this is as far as the similarity goes. Because of the gentle approach of the flanks of the lobe toward the nose, this cam is roughly equivalent to one that has about 250 effective crank degrees of duration. Again, the proper operating clearances are .012 in. for the intakes and .018 in. for the exhausts, hot and running. This cam has been considerably underrated by the general public because it was offered in the lower power Corvette versions. But stick it in a good 270 or 290 type and watch the eyeballs snap open. Actual performance checks in the same car and under the same conditions show the average zero to 60 mph time to be improved by a very respectable 1½ seconds, with this cam as opposed to the Duntov, while the average zero to 80 mph time took on a full two second improvement. Over a standing quarter-mile, the trap speed was about the same as with a Duntov while the elapsed time was consistently ¾ of a second faster. During this test, a maximum rpm limit of 6000 was used with the '56 Corvette cam and 6500 for the Duntov, which might not have been quite fair. Nevertheless, this cam with its exemplary low speed behavior and the excellent display of torque make it the most logical choice for short road courses, for town use and for an occasional whack at the stop light drags.

So there we have the two stock cams for our engine. Both are available, both are cheap, both have their definite limitations, both are at extreme ends of the performance scale. However, only a very good special cam can supply the characteristics that are missing in each of the two stock examples.

There is one cam that must be avoided at all costs. This is the '56 Duntov. The reason is that the cam is retarded some seven crank degrees, which makes mid-range performance downright intolerable and affects top end power as well.

If we have come so far as to institute sufficient flexibility of mind to change cams to suit various course conditions, we have indeed made a major advance. But there is a very great deal more to the proper functioning of the Chev valve gear and we must incorporate each of the many details into our engine if it is to serve us faithfully.

First, the cam chosen for the task at hand *must* be "degreed in". If there are errors of two crankshaft degrees or more, corrections must be made. But don't be too hasty in condemning the camshaft itself. Angular errors are very common in Chev engines and can originate at any one or a combination of six different points as follows: The keyway in the crankshaft nose; the keyway in the crank sprocket; the timing mark on the crank sprocket; the timing mark on the cam sprocket; the bolt and dowel pin hole locations in the cam sprocket; the bolt and dowel pin hole locations in the cam.

The necessities for a valve timing check are a degreed crank pulley, a dial indicator with at least a ½ in. stroke and a good magnetic base for the indicator. The first step is to find top center of number one piston with the indicator. At exactly top center, a permanent scribe mark must be made on the tab of the front cover plate exactly opposite the "TC" line of the pulley. Now the timing chain and cam sprocket must be installed. The shop manual covers this quite well but it is necessary to use a straightedge to line up the "O" marks on each sprocket with the center of the cam and the center of the crank. This is very important because it is altogether too easy to mis-align the marks, causing the cam to be excessively advanced or retarded in relation to the piston. If very large angular errors occur in the valve timing check (12 or more crank degrees), this is the place to look first. The cam bolts are installed followed by the front cover plate and crank pulley. Both cylinder heads with valves and springs are temporarily installed with gaskets and several hold-down bolts. The lifters, pushrods and rocker arms are next in that order. If the crank isn't rotated after installing the cam, the TC mark on the crank pulley will line up the scribe mark on the front cover tab. This places number six piston at TC of the compression stroke and number one piston at TC of the exhaust stroke. Starting with number six cylinder, tighten the rocker arm stud nuts until the correct operating valve clearance is obtained. Then follow the same procedure with the remaining cylinders in the order 6-5-7-2-1-8-4-3, rotating the crank exactly 90 degrees between each cylinder. This isn't exact but it's close enough. Now pull number one cylinder up to TC of the compression stroke and turn the rocker arm adjusting nuts down until there is zero valve clearance plus ¼ turn.

This puts both valves slightly off their seats. Mount the dial indicator with the indicator stem parallel to the valve stem in both planes and the indicator button resting on the spring retainer of number one intake valve. The pre-load on the indicator should raise the stem by about 7/16 of an inch. Rotate the crankshaft in the normal direction of engine rotation until the indicator shows that the valve is at full lift. Make a chalk mark on the crank pulley opposite the scribe mark on the timing tab. Rotate the engine exactly one turn so the chalk mark is again lined up with the line on the tab. This puts the intake valve lifter at the center of the heel of the cam. Carefully reset the indicator dial to zero. Slowly and smoothly rotate the crank in the normal direction until the indicator shows that the exact specified clearance has been reached. Some cams are checked at operating clearances while others use a checking clearance for valve timing that differs considerably from the specified operating clearance. For example, if the operating clearance is .012 in. and the checking clearance is .025 in., rotate the crank until the indicator shows that the valve has been lifted .025 in. from the zero point. Count the number of crank degrees from the TC line on the pulley to the line on the timing tab and write this down. Continue to rotate the crank in the same direction until the same valve lift is shown on the closing flank of the cam. Write this down also, then transfer the indicator to the exhaust valve and repeat the entire operation, again making permanent notes. A double and a triple check is recommended to make sure the figures coincide.

Supposing that the specified timing of a cam is Intake opens 20 deg. BTC, closes 60 deg. ABC, Exhaust opens 60 deg. BTC, closes 20 deg. ATC. And suppose we will arbitrarily accept a two crank degree variation from the specified timing. A plus-or-minus two degree tolerance is quite all right because any difference in performance couldn't be measured, let alone felt. Then if the cam checks out from 18 to 22 deg. on intake opening, 58 to 62 deg. on intake closing, 58 to 62 deg. on exhaust opening and 18 to 22 deg. on exhaust closing, everything is within limits and we can lock it up and forget about it.

But suppose that instead of 20-60, 60-20, we get 30-50 on the intake and 70-10 on the exhaust. This tells us that the cam is excessively advanced in relation to the

(Continued on page 62)

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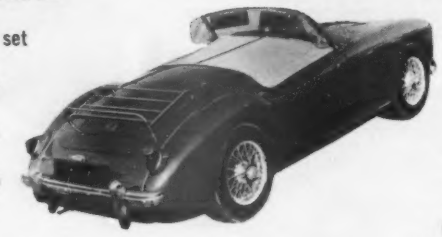

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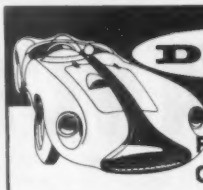

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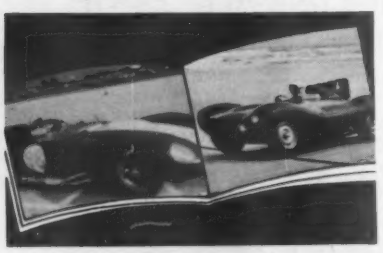

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Sebring

(Continued from page 49)

The first race was run as an SCCA event, but in 1952 it was decided to get the race on the FIA calendar. The FIA insisted on dealing with a national automobile organization, so the ARCF hooked up with the American Automobile Association. The SCCA, not wanting to bow to any other outfit, pulled out in a huff and made a few passes at sabotaging the event. A competitive SCCA event was run the week before at Vero Beach with negligible results.

Thus began the friction which still exists between the SCCA and Sebring, most recently evidenced by the SCCA's suspension of all its drivers who failed to file amateur intent affidavits before competing in last year's race.

The 1952 race, upped to 12 hours, drew its first entries from across the pond—two DB's, one of which managed to place seventh among the 10 finishers. According to Reg Smith, the race "was a dismal failure financially but in all other respects a roaring success." It was decided to press on regardless.

In 1953 the first strong foreign entry, a works Aston-Martin with Reg Parnell up, finished second behind the Fitch-Walters Cunningham.

In 1954 Sebring came of age. The FIA inaugurated the manufacturer's championship and included Sebring on the championship roster. The powerful Lancia team arrived in force, only to become the first striking illustration that 12 hours at Sebring are probably more gruelling than any other race in the world. With big-bore Lancias littering the roadside, Stirling Moss and Bill Lloyd stroked an OSCA to first overall.

1955 was undoubtedly the most hectic year in the race's existence. The winner wasn't officially pronounced until long after the fans had packed up their bourbon and gone home and the Ferrari and Cunningham Jaguar teams had engaged in a hassel that involved everything but full nelsons.

The public address announcer, anxious to diminish the confusion caused by the record 80 starters, intoned that although the Hawthorne-Walters Jaguar had crossed the finish line 19 seconds ahead of the Hill-Shelby Ferrari, the Ferrari was actually a lap ahead and so had won the race. As the saying goes, up went the balloon.

After frantically checking most every lap chart available, somebody thought to peruse the pit stewards' records. Lo and behold it developed that the Ferrari had lost a lap in a seventh-hour pit stop and the Jaguar was the winner.

That year was also notable for several other reasons. The AAA had pulled out of racing so the Automobile Racing Club of Florida was formed as the sponsoring organization. But since there was no national middleman between the FIA and a possibly-irate public, the FIA demanded unlimited liability insurance—not 10 mil-

lion dollars or 20 million dollars, but unlimited. Various firms pushed the coverage to the 20 million mark and after scouring two or three continents, the ARCF found a small Belgian firm which for $400 agreed to take care of claims from 20 million dollars on up. The FIA relented the next year and to Smith's knowledge no race before or since has ever had unlimited liability coverage.

1955 also marked the first sign of structural permanency: a foot bridge over the course. The design of that edifice was considerably more sane that that of the vehicular bridge added last year—the plans for which are apparently confused with those of a roller coaster. That year's race was memorable for Ray Crawford. Finding the supply of good co-drivers short, he climbed in his Lincoln-Kurtis and drove for 12 hours, finishing first in class and 13th overall.

The Sebring sports car race's history since 1955 is rather well known: Fangio and Castelotti in a Ferrari in '56, Fangio again with Behra in a Maserati in '57 and last year the Hill-Collins Ferrari. The future appears as bright as the weather which has blessed each race day.

There are problems, to be sure. The airport is anything but inactive and the Government recently has added an exotic installation designed to cause lines in the brows of crowd-controllers. The mysteries of the screw-worm are being investigated in the infield and the screw-worm experts demand ready access 24-hours a day for four years. Undoubtedly of more concern to the race fan is Sebring's reputed lack of hospitality – the contention that the town's non-firemen are out to get richer than the firemen.

The ARCF is a bit grieved about this reputation. While conceding the price of hotel rooms in March bears only faint resemblance to the price the rest of the year, it is averred that considering what happens to prices in Indianapolis and Le Mans, the charges of piracy are not founded in fact.

There's also the gripe voiced by both drivers and spectators that Sebring is a dull, unimaginative course located too far from the people who want to see and drive in road races. Smith says the ARCF has proved it can handle a championship event and this means a great deal to FIA. Smith adds that any other U.S. course would be too cold in March with the possible exception of Riverside, which is 4,000 miles further from Europe.

Smith readily admits Sebring isn't the Nurburgring, but asks why run the Nurburgring twice? Sebring has established itself as a punishing course, particularly on brakes, he says, and has a particular place among the various tests of racing automobiles.

To get a mite of publicity back in 1953, Smith had friends in Europe bombard newspapers and magazines with questions about the Sebring race. The publications, baffled at first, have since learned the United States does have a first rank sports car race and, oddly enough, it's in a place called Sebring, Florida. When Moss, Brooks, Hill, et al., lock horns for the last time this year in the world drivers' race, the battle field will be in Highlands County.

—Steve McNamara

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Crise's Dices

(Continued from page 27)

any rate it ate up the competition to win at 71.48 mph. Class D was taken by Doug Stearly of Conshohocken, Pa., in a Mercedes 300SL roadster closely followed by Constantine in the DB 2-4 Mk III Aston.

It was still wet when the 25-lap main go for all classes got under way behind Crise in an M-B 300SL pace car. First away was Jeffords, followed surprisingly enough by Furlong in the white-hot Ace. Furlong held down the spot for three full laps until Constantine turned on the tap in the Aston. Jeffords also put his foot well and truly into the firewall and made a consistent 77.88 mph lap after lap, some six-mph faster than his previous time. The finish was Jeffords, Constantine and Furlong in that order with the winning time for Jim of 76.74 mph for the 112.5 miles. That, except for a party, finished Thursday.

The second racing day of the foreshortened Speed "Week" opened with a blast of modified engines as the full-house machinery got its first chance at competition with a pair of five-lap heats and 25-laps worth of Governor's Trophy. The first of the preliminary bouts got under way with Ricardo Rodriguez in a sizzling 1588 cc Porsche RS Spyder doing what comes naturally and running off from the others in the under-two-litre class. The 16-year-old boy wonder from Mexico completed his five rounds in 16':19" which gave him an average of 82.71 mph. Behind him were Ulf Norinder, Sweden, in a 1.9-liter Maserati and former Healey pilot Gil Geitner now driving a two-litre Ferrari Testa Rossa TRC.

Only 12 out of scheduled 25 big bore machines showed on the grid for the second curtain raiser, the remainder apparently being saved by canny owners for the main event. This was George Constantine's chance to shine and shine he did, threatened only by Pedro Rodriguez (Ricardo's 18-year-old brother) in the ex-Hill-Gendebien LeMans winning Ferrari 250. Pedro was followed in by E. D. Martin of Columbus, Ga., in a similar three-litre 250 Testa Rossa. George won by some six seconds at 87.52 mph.

The main event brought 32 cars to the grid with the Scarabs up front by virtue of their blistering practice times. For the first four laps its was Daigh and Reventlow going away and then on the fifth lap Daigh's machine suffered the U-joint problem mentioned earlier. Lance kept up the pace and from then on it was only a matter of sweating out the lasting qualities of his rubber. Busy George Constantine, this time in the Aston DBR-2, moved into second spot where he stayed except for a six-second pit stop to tie up a dragging exhaust stack during which he lost the spot momentarily to Pedro Rodriguez, a loss which he quickly remedied. At the finish it was Lance, Constantine and Ed Crawford in Don Perkins' "stock" 4.5 Maserati. Winning average was 88.64 mph. Lance having gone the distance in one hour, 17 minutes.

Saturday was a beggar's hash of five-lap races, one each for Porsches and Ferraris of all categories and two each for Austin-Healeys, Bahamas residents and ladies

making eight in all. Ricardo Rodriguez won the Porsche event going away and Bruce Kessler took the Ferrari race in John Edgar's venerable 4.9 machine, the one in which Carroll Shelby campaigned so successfully in seasons gone by. Bruce had things a bit tougher than did Rodriguez, the Ferrari event being run as a handicap event with two Cuban 2-litre TRC's being given a 50-second head start which is a lot of time in a five lap event. Bruce made up the distance in less than three laps, averaging 87.15 mph for the five laps.

Bahamian Peter Bethell took everything in sight in both the Islander heats (two of a total of three for the week, the third of which he took the next day) and both Austin Healey affairs. Peter's car had been given the treatment recommended in December's SCI, said treatment being administered at Healey's Warwick plant. The car is used as everyday transportation by Bethell and on the street feels no different from any other Healey 100-6 but the combination of brakes and the edge in handling make all the difference, allowing more exhuberant use of the right foot.

The ladies' events were split by Evvie Mull and Denise McCluggage both in Lotuses. Denise didn't finish the first heat due to the fact that at one point she moved the shift lever from fourth to third while the gearbox preferred to remain in fourth, i.e., the lever moved but the gears didn't. The cumulative points gave the total to Mrs. Mull who finished both heats and second spot to Marion Lowe who was second in the first heat and third in the final.

Then came the big day. For a change the weather was near perfect. The racing started with the last heat of the Islanders' race which was won handily by the above mentioned Peter Bethell.

Next was the Memorial Cup event. Much of the drama of this one has been recounted earlier. The majority of the cars were being saved for the 252-mile Nassau Trophy race but 24 cars showed on the line for the rolling start. With the Sadler car out, E. D. Martin took over the lead and stayed there, followed by Ed Crawford in the 4.5 Maser. Third place was a battleground between Rod Carveth in a DB3S Aston and Jeffords in the big Corvette. The Milwaukeean finally eased by Carveth and the finish was Martin, Crawford, Jefford and Carveth. The winner's average: 87.98 mph.

Most of the main event has been told but three highlights stand out. On the 13th lap, Bruce Kessler in the big 4.9 Ferrari pulled in dragging a flat tire. Crew Chief Joe Landaker got him out with four new tires and a full load of gas in 64 seconds flat. It was in vain, though. A previously troublesome gearbox gave up the ghost two laps later and Bruce was through for the day. Next, Shelby came in with a flat rear tire on the 5.8 Maserati. This time the Edgar crew under Landaker got the job done in well under a minute but to no avail—the car wouldn't start due to a broken battery post. Push starts were accounted illegal so the 5.8 was out too. The big Pontiac had blown another gasket much earlier so this left the entire Edgar entry sidelined.

The final highlight had all the elements of a comic opera. Pedro Rodriguez, running a good steady second, came in on the

(Continued on page 64)

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ART CENTER SCHOOL

SADLER Mk3

(Continued from page 37)

exception is the steel stamping which holds the Schaeffer-built clutch together.

An all-copper radiator, 24-inches wide, 15 deep and 2½-inches thick provides all the cooling needed. Because the engine itself is so low, there is no need for a header tank. The two one-inch water pipes actually run slightly downwards to the radiator, but the filler neck is well over the water level in the cylinder heads.

Not to be ignored is that the engine and gearbox are mounted about 1½-inches to the left of the car's center line. With the driver sitting on the right, this move increases his foot room and to a mild extent, balances his weight.

Bill feels very strongly about driver comfort, pointing out that, "in extra fast cars such as this, the driver is so wrapped up in actually driving, trying to stay right on top of the continually changing situation, that he cannot afford even a 2% wastage of his concentration on such non-essentials as leg cramps, wind-buffeting, blisters from stiff steering or too-hot cockpit surfaces."

He continues, "Comfort is not all physical. It's partly psychological, too. In other words, a car should handle. Obviously, both qualities are desirable."

"People in England have been building cars for road racing for years now and while I was there, I learned lots of interesting things that they take for granted that we've never heard of over here. For instance," Bill went on, "by raising the outboard ball joint in the steering linkage, you can increase the amount of toe-in you get with body roll. Even on a car as low as mine, load transfer makes the outboard wheel the one to watch.

This toe-in with body roll gives an effect which the driver interprets as oversteer, as the front wheels turn further into the corner without his moving the steering wheel. Now, this is just jim-dandy for sharp hairpins but it's no good at all on a long fast turn.

"I laid the entire front suspension out on paper first." He went on to point out that the geometry was based mostly on a desire to use an unmodified Morris Minor rack and pinion steering set-up. Actually, he did have to weld a bolt on to the end of the ball socket in order get more threads in contact with the steering arms, because the tread is about three inches wider.

Continuing, he remarked, "In order to make the front suspension adjustable, or perhaps I should say, so that I could tune the chassis too, the bolts that install the steering gear fit through slotted holes in the frame." The theory is that moving this unit down is the same as raising the ball joint further outboard, and it saves bending and rebending the drag links. "These changes are much more significant than anything you can do with tire pressures."

Bill made his own wishbones. The upper ones are ¾-inch diameter, the lower are ⅞. Their inboard pivots form a ten-inch square on the frame but the width of the top one is only 7⅜-inches compared to the bottom one's nine. The ball joint on the upper wishbone is sawed off a Triumph TR upper joint, all the rest below it is stock TR (though cadmium plated). Eleven-inch disc brakes are also from the Triumph parts bin but instead of DS-1, he uses Ferodo's DS-3 Severe Service pads.

In the design of the rear suspension Bill Sadler has again sought adjustability. But first he shortened the wheelbase four-inches, having found the Mk 2 had more than enough directional stability on long fast bends and was, if anything, a bit hog-like to get around slow, tight turns.

"In cars as light and as powerful as this," Bill says, "I think that the geometry of the rear suspension is much more critical than the front. On the Mark 2, you'll remember, I added a single radius rod running forward from the wheel hub housing. Its angle relative to the ground is like the height of the steering linkage. If you drop the front pivot point, you get more toe-in with body roll, if you raise it, you can get toe-out. And as before, the driver sees these as over- and understeer characteristics, although, strictly they're not.

"This time I've put 10½-inch discs, brakes, outboard so I need two radius rods instead of one in order to handle the braking torque." Bill hasn't made any provision for raising or lowering their forward ends, but with Heim spherical rod ends threaded on each end, they are adjustable for length and therefore for toe-in.

Dynamic changes in toe-in may be altered another way. The specially fabricated swing arms are in unit with the wheel-hub carrier. A variety of ears carry the two radius rods and the combined coil spring and Koni shock absorber assemblies. The square section swing-arm tapers down to another Heim spherical bushing at the car's center line. A single large bolt serves as a hinge pin for both swing arms, the left one being just in front of the right one. Adjustment is achieved through the provision of many spacers between the pair of ball joints and the two brackets provided on the frame to carry the hinge bolt. By putting more shims to the rear, the bushings are moved forward, increasing the toe-out.

Bill suggests, "Someday, perhaps instead of using shims, we can move the flanges themselves and have them connected to a ratchet and handle of some sort in the cockpit. That way the driver could alter the handling characteristics to suit the particular corner he's about to enter."

When asked if he might use hydraulic or electrical means, with perhaps a speed sensitive automatic control, Bill made it quite clear that he is no disciple of the GM Tech Center. Instead, he follows the advice of Bill Stout, designer of the Ford Trimotor. To wit, "Simplicate, and add lightness."

With an attitude like this, a willingness to explore new areas of design and with enough energy for two, Bill should go a long way towards putting the American continent on the road-racing map.

Perhaps someday his production project may be revived, but currently Bill speaks of producing duplicates of this Mark 3. His total involvement is today directed at high speed handling, a field which he feels is just opening up. But if USAC should promote races for Chevy-engined single-seaters, he'll surely be one of the first to build one.

Stephen F. Wilder

Brothers Chevrolet

(Continued from page 17)

was $12,000,000 down and nobody would lend it. Finally a New York syndicate agreed to help out. In these days of the Securities Exchange Commission and the other such instruments of enlightenment with which Franklin Roosevelt prevented American capitalism from cannibalizing itself it's a little hard to believe what bankers of the happy 1900-1914 period could and would do once they got a hammer-lock. The banks agreed to loan GM $15,000,000 at 6 per cent per year interest. Of this, the firm actually got $12,000,000. The other $3,000,000 never left the vaults. That was for openers. Then, as payment for having arranged the loan, the banks took $4,169,000 in GM preferred stock and $2,000,000 in common. All in all, the syndicate stood to make a 75 per cent profit on the deal, PLUS $9,000,000 a year in interest. The final condition was that Durant resign, which he did, on November 15, 1910.

Durant had not left GM without mad money, and he used some of it to buy the Flint Wagon Works. Here he set up the Little Wagon Company. (This was not a synonym for a Small Cart, the president being named William H. Little, once general manager of Buick.) Louis Chevrolet, naturally loyal to the man who'd given him his chance, proposed to design a small car, a *voiturette* such as Ettore Bugatti (you thought I wouldn't get it in, eh, Christy?) had first shown the world in the Bebe Peugeot. Durant thought it was a good idea, providing the car was beefed up enough to cope with American rural conditions, and Louis went ahead.

The first car the Little company made was a four-cylinder bucket priced at $700. In 1911 the Chevrolet Company appeared with Louis' design, pretty big by now, a five-passenger touring car at $2,150. It was a notable success, and 2,999 units were sold. Louis was a principal in the Chevrolet company, and Arthur and Gaston were in as well on lesser elevations. In the next two years Chevrolet sold 16,000 cars and made a profit of $1,300,000. New models poured out, such dazzlers as the Royal Mail roadster, at one time as much a part of a doctor's outfit as his stethoscope, the Amesbury Special, the "490" and the Baby Grand. But Louis wasn't convinced and in 1913 he dropped out. Durant bought up his interest in 1914 and Louis went off on his own.

The Monroe racing car was Louis' design, and it won at Indianapolis in 1920, Gaston Chevrolet at the helm, beating full teams of Ballot and Duesenberg machines. Louis had designed the Frontenac, too, and the Frontenac was big for a while, and the brothers must have thought, now and then, that the Fronty would be the golden egg. Race-car oriented, they couldn't know that they'd left the golden egg back in Flint. Frontenacs ran 7th and 9th at Indianapolis in 1919, Louis and Gaston up and Arthur in the pits. They won at Sheepshead Bay, a big-league circuit indeed in those days, in July and September of 1919, a 100-miler at 110 mph, 150 at 109 mph, Gaston up both times. On the same day in July, the 4th, that saw Gaston win at Sheepshead,

(Continued on page 66)

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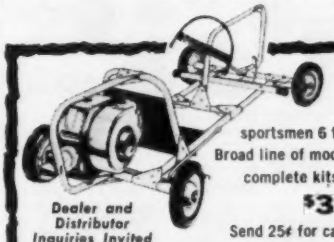

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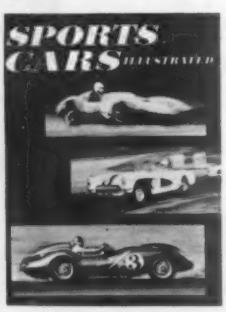

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MG-Chevy

(Continued from page 43)

with a '54 Studebaker) was used to install a 3.07 ring and pinion.

On the outboard end the Studebaker backing plates, brake shoes and brake drums were used as is. The MG wheels could not be altered to fit this set-up, so Brett used Studebaker wheels instead. He drilled 15 holes in each wheel, standard for brake cooling on the MG, and installed MG hubcap mounting studs. Mounting pads made to fit the MG rear springs were welded in place and the new rear end was ready for installation.

A Corvette driveshaft was used; the only alteration was shortening. The rear universal joint fit the Studebaker driving plate as is. A battery box was made and welded to the frame side rail at the right rear just ahead of the rear axle. The battery is reached by removing a panel cut in the floor of the luggage compartment.

The body was then put back on the chassis, and the floorboards and floorboard center supports were reworked to fit around the Chevvie transmission bell housing. A pair of hanging pedals with hydraulic brake cylinders were taken from an English Ford. A mounting for these pedals was made from 3/16 by 4 inch cold rolled steel plates and welded to the cowl support bar. Two bellcranks and link rods were made to connect the clutch pedal to the standard Chevrolet throw-out arm. The MG cowl and firewall assembly was then cut out to clear the engine. This operation completely removed the old MG battery box but did not disturb the toolbox. A new firewall and bell housing cover were formed from 22-gauge sheet steel and fitted after the cowl-section had been reassembled to the body. A 1½ inch hole was cut in each of the two boxlike MG front cowl supports to make the rear spark plugs accessible.

Since the left hand cylinder bank interfered with the MG steering column, the column was altered with two universal joints to pass under the cylinder block and attach to the pinion shaft at the lower end.

A dual exhaust system was devised with two Cadillac glass-packed mufflers and two inch tubing. The MG radiator was used with a slight alteration of the water outlets. The Chevvie generator was moved from left to right on a special mounting bracket in order to clear the radiator water inlet.

The MG hood did not quite clear the exhaust manifolds at the front end, so a "blister" was hammered out on each side of the hood. Then the front hood latches were moved forward about 4 inches.

Because of space limitations, the Chevrolet fuel pump could not be used, so a Bendix electric pump was installed beneath the gas tank at the right rear.

A new instrument panel was made of .064 inch aluminum. A complete set of Stewart-Warner gauges and a Corvette tachometer were built into the dash along with horn, ignition and light switches. No speedometer was installed because suitable gearing was not available. Speed is determined by a calibration card showing speeds for various rpms.

The job was completed by painting, re-upholstering and the installation of a new top and curtains. The weight addition with the new engine was only 135 pounds, and relocating the 30 pound battery in the rear helped even out distribution. The special's roadability is just about as good as any stock MG, which speaks well for Brett's choice of the light Corvette mill. Even with the dual quads, it gives 15 miles per gallon.

Last report from our friendly Chevrolet dealer near Mineola was that an inconspicuous fellow with an inconspicuous MG was asking about a not so inconspicuous fuel injection set-up. As the story of Brett Nichols feat is published we wager that a few innocent MG owners will be recipients of wary glances.

—Philip Peyton

Lister-Chevy

(Continued from page 41)

As the race grew older it did get cooler, and the Lister began to settle down to around the 200° F. mark. With the car's blood pressure back to near normal I began to circulate a little faster. I found myself holding down fourth spot while having a good race with Jean Behra in the RSK Porsche. On the next to the last lap, coming down into the 9th turn again — admittedly somewhat slowed after my earlier excursion — I shut off at the usual mark, shifted down, and *wham*, the rear wheels locked up. This is probably more disconcerting than having one front brake lock up — in fact more so because I was not even on the brakes. The car did about the same tour, coming to rest with a dead engine on the infield. Frantically I tried to re-start, watching in the mean time all the cars it had taken me so long to pass go by. One of the flagmen ran over and yelled in my ear — those exhaust stacks — that water was shooting out of the engine. I leaned over the side, and by God, he was right. Each time the engine turned over a spurt of water shot out of the appropriate pipe. I was about to give up when the engine caught, and off we went on seven cylinders to finish a hot and tired eighth.

Despite the heat I was in good shape after driving 200 miles. I had no blisters on my hands — a tribute to the Lister's light steering and the Chevy gear box. I did have a large blister on my left foot, but this was due to the high engine heat.

After the excitement died down we held a postmortem on the car's performance. The overheating was caused by a spring that had collapsed inside a water hose, while the hard starting — and running on seven — after the second spin out was caused by a dime-sized chunk dropping off a poorly forged valve, which caused the engine to sieze. The only basic fault I found with the car was the front-end lifting at high speed. This can be corrected, and I understand that a new Lister expressly designed for the Chevrolet engine will have a new body shape to prevent instability. If you want to go racing in the big-boy class in a car which gives you a chance to try your hand at power engineering, the Lister fills the bill.

—Bill Pollack

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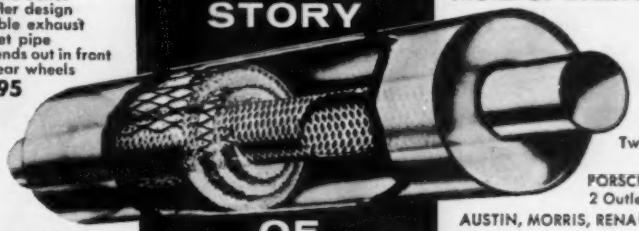

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Jaguar-Chevy

(Continued from page 47)

Before anybody who intends to copy this procedure starts walking around telling himself how smart he is, he had better take into consideration one other problem. After the fabrication of the header, there cropped up the little nuisance of getting the spark plugs out. Plugs No. 1 and No. 2 are not too rough, providing the mechanic isn't in a hurry when reaching through the maze of bracing and plate, and takes care not to burn himself on the hot pipes. However, No. 3 and No. 4 lay back next to the side of the toe-board, and constitute as formidable a task of removal as was ever designed by the most conscientious engineer from Detroit. Extraction was solved by making a special tool which slips into the narrow confines, fits over the plugs, and works on a ratchet principal to free the threads from their seat in the block. Insertion is accomplished simply by reversing the ratchet drive.

With the engine location finalized, work began on bolting it down in such a manner as to add rigidity to the forward frame members. The front mounting pads on the V8 are tucked in towards the block, leaving a considerable gap between their bolt holes and those in the D's mounts. In order to retain the D pads, and join them with the Chevvy's mounts, Silnes built a slightly bowed bridge, which spanned the distance between the frame rails. Made of 1½ x 1½-inch 4130 steel, the bridge was welded to the original supports, and gussetted on the bottom side at points where the V8 block bolted to it.

Rear mounts were fabricated by welding a vertical bracket, consisting of two triangular shaped plates, to the frame, and drilling a hole through both pieces of metal. The plates stand side by side, with enough space separating them so a Jag mounting pad can be slipped between and lined up with the bolt holes. When all four corners are snugged down, the whole layout provides a rather orthodox four-point suspension system.

Considerable attention has been given to chassis handling, because this important factor can mean the difference between leading the field, or bringing up the rear of the pack. Since a portion of the increase in lap times in recent years has been due to jacking the weight, so the wheels get a better bite in the turns, Silnes smoked over the bars at great length before forming jacking stops on their rearward ends. Inasmuch as both bars had to be laid over slightly to the left to drop the engine lower in the chassis, he decided to go whole hog and build stops which would permit the car's front end to be raised or lowered simultaneously, or a corner at a time.

Externally, the bubble bulging up from the center section of the hood is a dead giveaway something is amiss. A sheet metal canopy had to be added to clear both the top of the fuel injection apparatus and the rear mounted distributor. Other than that, the overall contours of the regular D remain as is. Some hacking of the baffling on the underneath side of the hood enabled the generator and its brackets to clear the covering, with special brackets being made to swing the generator away from the valve cover. In normal operating position, the generator's casing hangs over the cover, and lies in a rather elevated plane in relation to the rest of the engine. By recessing the left baffle, a concave plate acts as a protector for the casing, brackets, and drive pulley.

The idea of using a Corvette four-speed gear box naturally received first consideration. Further investigation revealed that it wasn't going to be easy. The starter motor on the Corvette is mounted on the block instead of on the transmission, as is the case with the Jag, so to use the Yankee four-speeder, it would have been necessary to revamp the right torsion bar position due to the starter laying directly on the bar. Such a change would have meant a major rework involving the whole front end. A second item which had to be taken into consideration was the pressure for the hydraulic brakes which is provided by a pump in the D's transmission. The use of a Corvette unit meant an accessory pump of some type would have to be rigged up to supply the line boost.

The hot rod boys have developed the science of engine-transmission switching in American passenger cars to a fine art, and being somewhat of a well-trodden path, the same basic course was followed in marrying English alloy to American cast iron. A special McBar adaptor plate constituted the wedding band. Inside the housing, a few tricks still were needed to match the crank flange with the flywheel assembly. Contact took place via an additional small adaptor plate which hooked up the driving and driven members of the power train.

After viewing the Detroit behemoth sitting securely in his small European chassis, the big question Ensley tossed around in his skull was how to make it go. He was not a mechanic, and even if he had a flair for wrenches, there was a little matter of other business taking up his time. The point resolved itself by the rather incongruous situation of turning the Chevy engine over to one of the country's leading Plymouth stock car drivers, who prior to the factories departure from racing, was Chrysler Corp's fair haired boy.

With the exception of being known to local wheels, the name of Hershel White is practically unknown in sports car circles. In his own field of endeavor, however, he is a hot pilot, whose talent extends to the nuts and bolts, as well as the mechanical end of things.

By the simple expedient of starting on top and working down, the first thing to fall under White's scrutiny was the fuel injection system. His initial move was a step taken by the Rochester Products Division, but not revealed until the introduction of their '57 model. And that was to set the injector nozzles further into the ports for better turbulence. Dropping the nozzles does not increase the flow charge, but does tend to raise the thermal efficiency of the engine. The system has an adjustment arm on the side of the main body to richen or lean out the mixture, and the arm can be varied according to conditions encountered. This is the only

way to change the fuel/air ratio. Never drill out a nozzle to enrich the charge. It has exactly the opposite effect, as the bigger hole drops the pressure and causes the flow to become lean.

On engines employing carburetors, the practice of using a ram tube plus balance box is fairly well known. With fuel injection, the same idea will work, except you do not need the balance box. To get cool air into the venturi, a 4½-inch heater tube is connected to an air duct and run back to the bell mouth of the air manifold housing. Not only will the resulting temperature drop give a denser induction charge, but the tube also will induce a ram effect at the higher speed levels.

The usual hop-up tricks were included, such as porting and polishing the heads; removing sharp edges to get away from hot spots; countersinking the valves; and punching out the block to a four-inch bore to acquire 300-cubic inches of displacement. This last step keeps the machine still in Class C, while at the same time increases the torque and ups the compression ratio one-quarter point. To fill the larger holes, Forge True pistons are inserted with Perfect Circle's 98 oil ring, plus two top chrome rings.

The accelerator linkage gave White a chance to exercise his brain cells, since the stock linkage actuated the carburetors on the right side of the engine, while the Corvette's fuel injection linkage lay to the left of the manifold air housing. The system was reversed by having rod and bell crank segments travel from the stock pivot mounting on the toeboard back to the firewall, across the wall to the left side of the engine compartment, and then down to the links on the injection's main housing itself.

In respect to the electrical department, the standard ignition will get a whirl to see whether the spark will break down under heavy load conditions. Should any part of the circuit reveal a weakness, it is possible to readily adapt a magneto to the engine, and come up with a flame which would fire a third-rate grade of moonshine.

How it will perform is a matter of personal prediction, but the general consensus of opinion among race men who have looked over the car is it will be a handful. What with shifting gears, and keeping it pointed straight when the low-end torque from 300 cubes takes hold, the activities of the chauffeur can best be summed in one word—"busy."

The top-speed issue may be a toss-up between the V8 and the six-cylinder engine. The replaced Jag had the advantage of double-overhead cams, a tremendous relief from the inconsistencies inherent with reciprocating rocker arm gear, plus an enviable record of propelling the English mechanical gladiator over the ground at a rather rapid clip. If the V8 can turn 7000 or better, and still stay together, then it is apt to be knocking on Count Orsi or Enzo Ferrari's front door, requesting the pleasure of a small party. The Tupian feline embellishing the nameplate of this bolide has spit defiance in many a contest both here and abroad. And with an American touch to give that extra twist to its tail, the competition is liable to find they are playing tag with some pussy cat.

—George Moore

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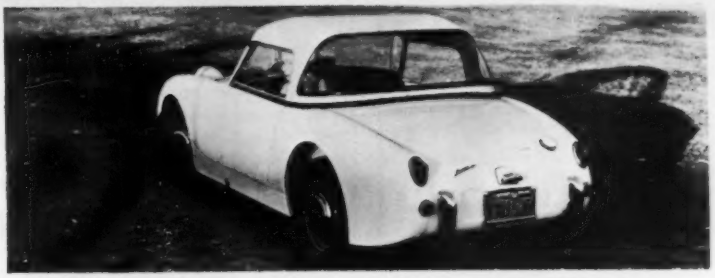

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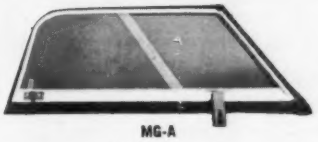

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Racer Brown says:

(Continued from page 50)

piston and must be corrected. This, or the opposite condition of having the cam excessively retarded, occurs all too frequently in Chevs, making this sort of valve timing check a vital necessity. To correct for the above condition, we must subtract the exhaust closing point (10) from the intake opening point (30), which leaves 20. Then we divide 20 by 4 to give us the correction in *camshaft* degrees, this being 5 degrees.

The easiest way to retard a chain driven camshaft the required number of camshaft degrees is to elongate the bolt holes and the dowel pin hole of the cam sprocket in a counter-clockwise direction when the sprocket is viewed from the front. This is best done with end mills of the correct diameters in a milling machine and to the exact point to affect the correction. To advance the cam in relation to the piston, the above procedure is reversed.

This phase of assembling the engine is certainly time-consuming and bothersome but its importance cannot be over-emphasized when we are trying to make the most of all possibilities. To carry it to its logical conclusion, it is definitely advisable to experiment by advancing and retarding the cam. It's a certainty that no two engines will produce an identical power curve, so what might be sauce for one could well be sudden death for the other. The only way to know for sure is to experiment. But don't go wild; advance or retard the cam a maximum of five crankshaft degrees from the specified timing, remembering that advancing the cam will improve the low and mid-range performance at the expense of top end power, while retarding the cam will have the opposite effect.

The lifters for the '57 through '59 engine must be Chevrolet part number 5231585 or a similar chilled iron equivalent. For earlier engines, use Chevrolet part number 5231315 or similar chilled iron equivalent. The difference is dictated solely by a change in the oiling system in '57 and later engines. In '56 and earlier blocks, the oil to the lifter galleries is metered by a flat milled into the rear cam journal and the oil hole in the lifters is located in the groove in the lifter body. In '57 and later blocks, the lifter galleries receive full system pressure and flow and the oil hole in the lifter is located above the groove in the body so that the oil that fills the lifter body and pushrod and lubricates the rocker arms and valves actually leaks past the clearance space between the lifter body and the lifter bore. Accordingly, '56 lifters cannot be used in '57 or later blocks or else the topside valve gear will be drowned in oil. By the same token, '57 lifters cannot be used in '56 blocks because of the risk of running the topside valve gear dry of oil. '56 and earlier cams can be used in '57 and later blocks, the flat on the rear journal having no effect upon oiling in the later types. However, to use a '57 cam in an earlier block requires a flat to be milled or ground into the rear cam journal, otherwise none of the valve gear will be lubricated.

—Racer Brown

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Crise's Dices

(Continued from page 55)

38th lap for tires and fuel. His crew worked with all the latin fury at their command and got him out still in second spot. The only trouble was that they neglected one tire and he went out with three new skins and one baldy. It was three laps later that the crew noticed the forgotten tire and frantically summoned in their endangered boy. Again they worked and again sent him out, still in second where he finished by a whisker with E. D. Martin hot on his tail feathers.

While it may seem that the 1958 edition of Nassau Speed Week was nothing more than seven days of bad luck compounded by inefficiency, such was not the whole truth by any means. True it was that with the exception of two Cubans, a brace of Mexicans (the Rodriguez brothers) and one lone Swede, the race was almost purely an American and Islander venture. Two possible crowd pullers, Stirling Moss and Joakim Bonnier showed but sat on the sidelines for one simple reason—both are professionals and no starting money was forthcoming. Both men felt that there was no reason why they should donate *gratis* the talent that at other times earns them their bread. Neither could the owners of their prospective rides feel differently. No money, no mounts—period.

Being fair about it, Crise and the Bahamas Development Board were caught in a squeeze not of their own making. In years past, Class A invitees got all expenses paid and the result was a full field of top cars and drivers. This year the SCCA ruled that such was crass professionalism and forced the promoters into charging a $150 entry fee. Racing expenses or no, Nassau is not the least expensive spot in this world to hang a hat. Virtually everything except bottled liquor, perfume, jewelry and cameras is triple-priced due to the fact that all goods must either be flown in or landed by ship. Adding up transportation, living and a fat entry fee makes for hesitation that not even June in December can allay entirely. The time was too short and it was too much to expect that a new Class AA entry could be formed to take care of special invitees to say nothing of the patent unfairness of such a measure to those already listed as Class A. These factors coupled with pure, blind bad luck in the form of inclement weather and the plague of gremlins that forced down most of the really interesting machinery, combined to produce a situation that few organizers could hope to solve to everybody's satisfaction.

Nonetheless it was still Nassau. When the sun did decide to shine it was bright and clear. It was still June in December and a respite from the shivering cold in less clement countries and most participants enjoyed themselves. Which, if Red Crise is to be believed, is the reason for the whole affair. Mr. Crise has a year to come up with another Speed Week. If he can exercise the gremlins, talk with the weather man and rid his race of outside interference in that length of time, the 1959 edition of Crise's Dices should be bigger than ever before.

—John Christy

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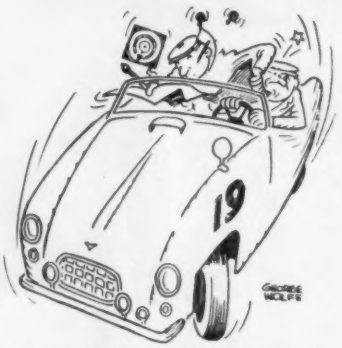

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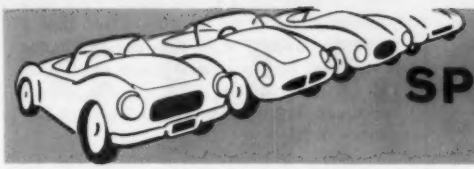

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Louis won at the Tacoma board track in a Frontenac, 80 miles at 100. They had a good car, and it had run fast from the beginning, but it wasn't going anywhere. Louis won at the Uniontown Board Speedway, 112 miles at 102, as early as December 1916.

Frontenac cylinder heads turned the T-Ford into quite a hairy machine for its time, and for a while "Fronty Ford" was something you heard a lot about, and that looked like money to Louis, too, but the appearance of the Model A killed it off.

Chevrolet and Durant prospered, though. Durant steadily built the company up, planning and scheming for one day, one hour. He set up Chevrolet in Delaware, he affiliated with the du Ponts. He began to buy GM stock in big bundles. It was easy: the stockholders were sore because the bank controlling the company had seen the profits run to $58,000,000 in three years but hadn't declared a dime in dividends! On September 16, 1920, Durant walked into the GM annual meeting, lackey$ laden with bundles of proxies staggering behind him, and said quietly, "Gentlemen, *I* control this company."

He did, too. He ran it in a big way. He paid Walter Chrysler $500,000 a year to run Buick, a salary that represented a $494,000 raise in two years for Chrysler. He brought in Delco and Hyatt Roller Bearing and Kettering and Sloan and Fisher Body and Frigidaire. But he couldn't stop expanding, juggling. He finally got too far out on the wire, the company's accountants guessed about $30,000,000 too far out, and the GM doors shut behind him again. This time, there was no Chevrolet to ride back in.

In the same year that saw Durant out of GM for the last time Gaston Chevrolet was killed driving a Monroe at the Los Angeles Speedway. Louis had stopped driving in 1923, and Arthur even before that. Arthur had never really liked it anyway, and he doesn't often show in the record: 1910 Vanderbilt Cup, Marquette-Buick, out at 88 miles with a broken chain, 1910 G.P., Savannah, out at 130 miles with a broken crankshaft while running 11th.

Louis tried boat-racing in 1925, won at the Miami Regatti. He worked for Stutz for a while and then in 1929 he and Arthur organized the Chevrolet Brothers Aircraft Company, intending to make airplane engines. It didn't work out, the brothers quarrelled and there was recourse to law. Louis won, but it was a case of winner take very little. In 1934 he went back to work for Chevrolet, stayed until 1938 when the illness which was to cause his death forced his retirement. He had a small pension from GM. He died in 1941. During World War II Arthur Chevrolet worked for Higgins in New Orleans as a master mechanic. In April, 1946, when he was 61, he hanged himself.

Durant lived longest of the four. He died in 1947. He was running a chain of bowling alleys and a grocery store in Asbury Park in New Jersey. Not just a bowling alley, a chain. Not just a grocery store, a supermarket. Characteristically, he was in early on a couple of things that were booming. He was thinking big, and all he needed, probably, was a little more time. But at 86, he didn't have it.

—Ken Purdy

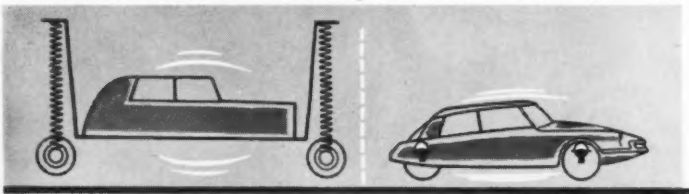
One of a series of technical bulletins from

CITROËN

Air-Oil Suspension

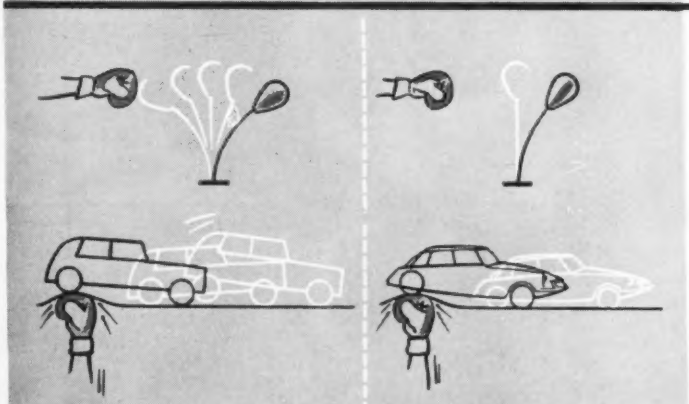
For the first time anywhere, in May 1954, Citroen adapted Hydropneumatic (Air-Oil) Suspension to a production car. This revolutionary suspension is now standard equipment on both the Citroen DS 19 and ID 19 models.

ORDINARY SPRING SUSPENSION | CITROEN AIR-OIL SUSPENSION



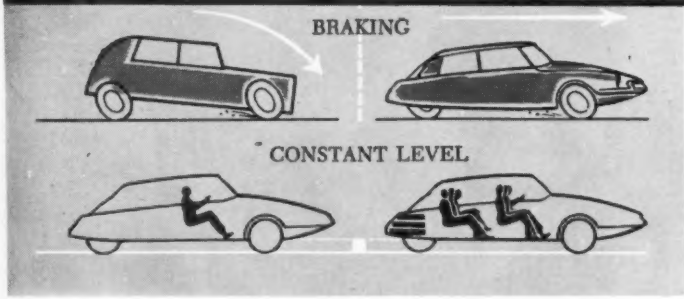
CUSHIONING EFFECT

A conventional suspension would require a ten-fold flexibility to begin to compare with the gentle cushioning effect of Citroen Air-Oil Suspension.



DAMPENING ACTION

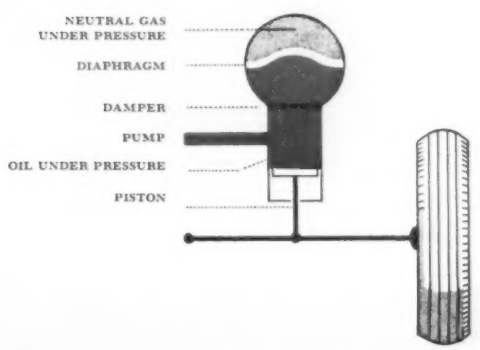
A damper element is incorporated in each hydropneumatic unit. Integrated in the suspension system, this damper element has the added advantage of never needing adjustment. Because of its concept, adapted to the Hydropneumatic System, it acts instantaneously and renders the suspension practically aperiodic.



CONSTANT LEVEL

Ordinary cars nose-dive upon braking. Citroen's automatic level-compensators keep the car horizontal at all times, even upon sudden braking. Moreover, the car is kept at a constant height regardless of the load that is carried. In case of bad road conditions, moving a small lever will automatically raise the car to a higher position.

In the Hydropneumatic System, each of the four independently suspended wheels is connected to the body by a Piston. By means of a liaison liquid, this piston more or less compresses a neutral gas (Air) pressurized in a sphere. The liaison liquid maintained under pressure by a pump, automatically assures the dampening action and level corrections.



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